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ROCOZ DATA REDUCTION AND ANALYSIS

PROGRAMS AND PROCEDURES

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JANUARY 19, 1984

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National Aeronautics and
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INTRODUCTION

General

The Rocoz data reduction programs transform data from the Rocoz photometer to ozone number density and overburden as a function of altitude. Required auxiliary data are the altitude profile versus time and, for appropriate corrections to the ozone cross sections and scattering effects, air pressure and temperature profiles. Air temperature and density profiles may also be used to transform the ozone density versus geometric altitude to other units, such as to ozone partial pressure or mixing ratio versus pressure altitude.

A set of seven programs are used to accomplish this. The programs and the functions of each are as follows:

RADAR: Reads the 7-track BCD tape, converts from English to metric units, converts from seconds after launch to seconds after the hour, and writes real numbers on the 9-track tape.

LISTRAD: Displays data from the "PASS1" radar tape generated by the Eclipse Computer at WFF.

RAW OZONE: Displays selected records from the digitized telemetry tape to enable a preliminary assessment of the instrument performance and data quality.

EDIT OZONE: For each rotation of the filter wheel, this program extracts a value for each filter, corresponding values of the compensation channel and of the uncompensated signal, converts telemetry data on battery voltage and instrument temperature to engineering units, and provides some statistics on instrument performance.

MERGE: Obtains altitude information corresponding to each filter observation; computes corresponding solar zenith angles

SMOOTH: Derives smoothed photometer output at integer altitudes for each filter, with statistical measures of deviations.

PROFILE: Converts the smoothed photometer data (intensity or intensity ratios) to ozone number

and air densities for evaluation of Rayleigh scattering effects. The program then converts the ozone densities and geometric altitude to other useful units: ozone partial pressure, mixing ratio, pressure altitudes, and, at intervals corresponding to standard pressure levels, SBUV pressure levels, and Umkehr layers.

History

The first of the series of Rocoz photometers was flown by A. Krueger in the 1950's; data reduction and analysis was with the assistance of a desk calculator. In 1977-8, D. U. Wright of GSFC and E. H. Shaffer of Systems and Applied Sciences Corporation (SASC) implemented the data reduction on the IBM 360/91 computers in the Science and Applications Computing Center (SACC) at GSFC. These programs were documented in the "Rocoz Automatic Data Processing User's Guide" prepared by SASC under Contract NAS5-24278.

These programs were revised by K. Tewari of P & P Industries to accommodate changes in tape format, modified to reduce uncertainties, and adapted to special projects, particularly, the use of the Rocoz instrument on various balloon platforms.

This latest revision, by E. Reed and G. Batluck of GSFC and S. Cooke of Republic Management Systems is the result of a line-by-line examination of the programs. Major revisions include:

The frames in each wheel rotation cycle are identified and handled in terms of the time tag rather than an index number.

The noise from sources other than analog-to-digital conversion is evaluated.

Some auxiliary parameters (e.g., earth radius) are computed more precisely.

Numerous changes were made to improve efficiency and to add to clarity.

Smoothing is accomplished by a least squares fit to $\ln S = A + B \ln (hs-hb)$.

The Profile program has been completely rewritten.

The effective ozone absorption coefficient calculation can be readily modified to include the temperature dependence of the ozone absorption.

A number of tests were added to the Profile program to evaluate the self-consistency of the data set.

"Pedigree" records were added to the EDIT, RADAR, MERGE, SMOOTH, and PROFILE programs to enable inclusion of relevant auxiliary information in the archived data set. The Pedigree records of each previous step are copied to the output tape such that the Profile tape has a complete set of Pedigree records giving the entire history of the processing of the data.

This document describes the result of this latest revision and includes details of the tape and data formats.

Implementation

These programs are written in Fortran-IV (Fortran-66) as implemented on the IBM-3081 computer in the Science and Application Computing Center (SACC) at GSFC. Tapes are identified through the FTIO set of subroutines rather than through the Job Control Language. Other system and SACC-supplied subroutines are:

CMOVE for efficiently moving blocks of data within the programs

BCD5 for converting BCD characters to EBCDIC

SHFTL and SHFTR for extracting the integers which give time information.

(Continued)

Data Requirements

The following information is needed for the complete analysis of the data from a Rocoz flight, using the GSFC set of programs:

1. Rocoz Data Sheet, identifying the vehicle and payload, giving statistics on time of flight and flight performance, and Dobson observations.

2 Calibration data for the Rocoz photometer giving:
   - Filter set number, when calibrated
   - Calibration of filter, A0, A1, A2, and/or filter shape
   - Zero offsets for S0, S1, S2, and S3
   - Battery voltage calibration (word 6)
   - Temperature sensor calibration (marker pulse height)

3. Rocoz telemetry tape, 9-track

4. Radar tape, 9-track, altitude, latitude, longitude, and time

5. Data sonde information:
   - Flight identification and launch time
   - Temperature vs altitude

6. ECC data
   - Flight identification and time
   - Altitude, ozone partial pressure, ozone column, air pressure and air temperature versus time
   - Radar track of ECC sonde

7. Strip chart of telemetry data (desireable, but not absolutely necessary)

RAW PROGRAM

RAW - Outline of Chapter

RAW PROGRAM

OVERVIEW

The sole purpose of the RAW Program is to read and dump sample sets of the digital data from computer facilities at Wallops Space Flight Center to validate contents of the tape before proceeding with the subsequent processing steps.

The sample sets may be chosen by record (Version 1 of Software-Input Card Data: Card 1, Variable 3) or by Seconds of Time (Version 2).

The actual processing of these data takes place when the 'EDIT' Program is run. Details concerning the digital input data and the approach to the analysis of same is provided in the 'EDIT' Program section of this document. A description of the RAW Telemetry Tape Format and related pertinent information may be found in the section entitled 'TAPE FORMATS'.

RAW PROGRAM

INPUT DATA

Columns	Format	Content	Variable
Card 1			
1-6	6A1	Input Tape #	TAPEIN
9-10	I2	Input File #	NF
13	I2	Version #	IVER
16-19	I4	Flight #	NFLIT
Card 2			
1-3	I3	# of Samples	ISAMP
6-9	I4	Beginning Rec #	IBEGIN
12-15	I4	End Record #	ISTOP
17-20	I4	Increment	INCR

Example:
010 0001 0010 0050
Print 10 sample sections of the first 10 records every 50 records.

Columns	Format	Content	Variable
Card 3			
1-6	F6.1	Start Seconds	TIMES
9-14	F6.1	End Seconds	TIME2

The first 2 cards are necessary and the 3rd card is optional, used only if output is chosen by seconds of time, rather than by Record # as in Version #1. Version #2 was never used after Flight # 290.

RADAR PROGRAM

RADAR - Outline of Chapter

RADAR PROGRAM

OVERVIEW

The Radar segment of software is intended to process the Radar tape as received from Wallops Space Flight Center only to the extent of reformatting the data such that it will be acceptable to the 'MERGE' Program which is run after 'EDIT'.

During the 'REFORMATTING', Radar data items not required in later processing were bypassed and a parity check was effected to properly locate the negative sign intended for selected data words. The resulting file is written unformatted onto a tape using the FTIO (Fortran I/O) package.

This 'REFORMATTING' effort was not necessary after Flight 316 when we began receiving Radar tapes which could be used in the 'MERGE' processing phase in their original form.

RADAR PROGRAM

INPUT DATA

Columns	Format	Content	Variable
Card 1			
2-7	6A1	Input Tape	TAPEIN
14-15	I2	Input Unit	IUNIT
19-20	I2	File #	NF
24-25	I2	# Files	NFILE
30-36	F7.2	# Seconds after Hr	STIME
40-42	I3	Flight	IFLT
46-47	I2	Date-Year	IDATE(1)
49-50	I2	Month	IDATE(2)
52-53	I2	Day	IDATE(3)
Card 2			
2-7	6A1	Output Tape	TAPOUT
14-15	I2	Output Unit	IUNIT2
19-20	I2	Output File #	NF2
Card 3			
2-5	F4.0	Vehicle	R(3)
8-9	I2	Launch Month	LMO
11-12	I2	Launch Day	LDY
14-15	I2	Launch Year	LYR
18-25	F8.1	Launch Time (HHMMSS.S)	R(5)
28-34	F7.3	Latitude (Degrees	R(6)
37-44	F8.3	Longitude (Degrees)	R(7)
47-62	4A4	Launch Site	SITE

Vehicle is either:
1. Rocket
2. Balloon

Launch Site is either:
- 01 Wallops Is., Va.
- 02 Poker Flats, Alaska
- 03 Natal, Brazil
- 04 Marambio, Antarctica
- 05 Palestine, Texas

The above card input was used for flights up thru # 315. Starting with # 316, the following card input is used:

Columns	Format	Content	Variable
2-4	I3	Flight #	IFLT
7-13	F7.0	Launch Date (MMDDYY)	DATE
16-21	6A1	Input Tape #	TAPEIN
24-25	I2	Input File #	NFILE

Beginning with Flight # 316, no radar output tapes are produced. Instead, the new version of radar tape is input directly into the Merge Program.

EDIT PROGRAM

Edit - Outline of Chapter

EDIT PROGRAM

Overview

The primary function of the EDIT Program is to extract for each rotation (cycle) of the filter wheel, a value for each filter and the corresponding compensation word. In addition, the battery voltage monitor and instrument temperature sensor are read and averaged, the length of each rotation (cycle) is noted, and some statistics on noise are generated.

The filter wheel contains four filters, designated S0, S1, S2, and S3, with the S3 filter at the shortest wavelength, S0 at the longest. When each filter is fully in the optical path of the instrument, the output of the photodiode is sampled and held, and a constant value appears on the telemetry word for the remainder of the cycle. A marker pulse on a separate telemetry word (channel) indicates the beginning of each rotation, defined as the time corresponding to an observation through the S0 filter.

Telemetry Data

Data is transmitted at rate of 8K bits/second, or 88.9 frames per second where each frame consists of a synchronization word followed by 8 data words, each 10 bits long. A typical rotation requires about 650 ms, during which the data are sampled about 58 times. The telemetry words are defined as follows:

Word	Function
1	Signal from the S0 filter
2	Signal from the S1 filter
3	Signal from the compensation detector
4	Signal from the S2 filter
5	Signal from the S3 filter
6	Battery voltage monitor
7	Marker pulse, temperature monitor
8	Signal from detector, before compensation

During the initial data reduction process each frame is tagged with time information (day, hour, minutes, seconds, and milliseconds) and grouped into records, each of which contains 110 frames of data.

In this program, the input data is read in Subroutine BLOCK. The Header record and Data Description records describing the tape are converted and displayed. The data words are

converted to IBM format by switching bytes. The three time words appended to each frame of data are broken apart and interpreted in terms of the date and time.

Identification of Cycles

The identification of the start of each cycle for each of the four filter words is done in Subroutine CYCLE. CYCLE transfers data from the input telemetry tape records to the array, KEEP, always maintaining 200 frames of data in KEEP, and calling Subroutine BLOCK whenever another telemetry record is required. Before moving a frame into KEEP, the data is tested to be sure that the times are increasing and that word 7 (marker pulse) channel is either near the expected base level or the expected marker level, thus identifying and discarding frames that show evidence of being noisy. The initial expected values (MPEAK and LPEAK) are provided on cards as obtained from inspection of a listing of the telemetry data, and are updated by a running average as the program processes the tape. The timing of the changes is diagrammed as follows:

```
M
M__¦‾‾‾¦______________¦‾‾‾¦______________¦‾‾‾¦__________
S0-
S0 __________________
S0                    ------------------
S0                                       _______________
S1-----
S1      ___________________
S1                          -------------------
S1                                               ___________
S2----------
S2           ___________________
S2                               -------------------
S2                                                   _______
S3---------------
S3                ____________________
S3                                     -----------------
S3                                                      __
```

The beginning of a set of values for word 1 (S0) is taken as the first frame after a base value and containing a marker value. The beginning of the word 2 set (S1) is the opposite transition, that is the first frame with a base value after a frame with a marker value. The end of the S0 set of values is the frame with the last base value before a marker value. The time interval between the start of the S1 set and the end of the S0 set is divided into thirds; the S2 set of words is assumed to start at the end of the first third; the S3 set of words is assumed to start at the end of the second third. The length of the S1 set is taken to be 94% of the length of the S0 set, S2 set is 88%, and S3 set is 82% of the S0 set. (The shorter times for some filters allow for uncertainties in the start times due to noisy data and for variations in the cycle time.) Thus, 40

to 60 samples are available for each of the four filters, unless diminished by noise and telemetry drop-outs.

Selection of Filter Values

Since the S0 - S3 words are presented to telemetry by sample-and-hold circuitry, each channel should remain constant for a complete rotation. Inspection reveals that this is not the case: the first word is sometimes at the old, rather than the new level; the digitization error is typically $\pm$ one bit; noise either in the instrument and the telemetry system can introduce greater variability; drop-outs in the received telemetry signal can reduce the number of available samples. Subroutine AVE selects a value representative for the array of words available for each filter.

The rules used by Subroutine AVE are:

- If only one sample is available, use it.
- If two samples are available and agree within 6 counts, take their average.
- If three or more samples are available, a subset is chosen in which all the words are ± 3 counts of a test value. If this subset represents more than half of the samples available, the average of the values in this subset is used. If the subset represents less than half of the values, a new test value is chosen (the next word) and a new subset tested.
- If the above rules do not result in an acceptable value, the word is set to -99., indicating that there is not an acceptable value for this filter during this rotation.

Subroutine AVE is used not only to obtain representative values for each filter but also for the marker pulse height and for the marker pulse base level.

For each of the four filters, Subroutine COMPWD finds the value of the compensation channel (word 3) corresponding to the time of the first sample for the filter. It chooses the frame near the start frame chosen in Subroutine CYCLE, for which word 8 (the uncompensated signal through the filter wheel) is at a maximum; word 3 of this frame is then chosen as representing the value of the compensation word at the moment that the filter wheel signal was sampled and held.

Averaged Values

Running averages of the most recent ten values are maintained for the height of the marker pulse, the base level of the marker, and the length of the cycle and used for the detection and deletion of aberrant data. To do this, Subroutine Cycle calls Subroutine TENAVE as it nears the completion of processing for each cycle.

The average battery voltage is obtained from a simple average of all the values of word 6 in the most recent record of telemetry data (110 frames) transferred into the array KEEP by Subroutine CYCLE. The instrument temperature is obtained from the value of the marker pulse in the cycle under consideration. The average value of all the compensation words in the cycle is obtained in Subroutine CMPWD.

The average values for the temperature and the battery voltage are converted into engineering units in Subroutine CONVRT. Calibration data are obtained from the preflight testing and given to the program through DATA5 cards. The temperature data are read in at three temperatures and a standard temperature versus counts curve is adjusted to fit the calibrations at the three temperatures. This adjusted curve is then used to convert the counts to temperatures. Calibration values for the battery word are read in at two points, and a straight line relationship is assumed.

EDIT PROGRAM

Common Areas

Four labeled common areas are used: LABEL1 transfers initialization data from MAIN to Subroutine CYCLE; LABEL3 contains the telemetry data, transferring it from BLOCK to CYCLE; LABEL5 contains the output data generated in various subroutines;, and CAL contains calibration data, making it available in MAIN for use in the Pedigree records and in Subroutine CONVRT for conversion of telemetry data to engineering units.

COMMON/LABEL1/IREC,DELTAT,MPEAK,LPEAK,LIMIT

Variable	Type	Content
IREC	I*4	Number of the last record to be processed (Statement is in Block, usually commented out.)
DELTAT	R*4	Initial value for length of cycle, ms.
MPEAK	I*4	Initial value for marker pulse peak.
LPEAK	I*4	Initial value for marker base level.
LIMIT	I*4	Delta for acceptable marker values.

COMMON/LABEL3/DATA(1210),INPUT (1220)

DATA(1210)	R*4	Input record in IBM format, no header.
INPUT(1220)	R*4	Input record from telemetry tape.

COMMON/LABEL5/OUTX(20)

OUTX(20)	R*4	Output array.

COMMON/CAL/B1,V1,B1,V2,T(3),VT(3)

B1	R*4	Battery voltage, first calibration pt.
V1	R*4	Counts corresponding to B1.
B2	R*4	Battery voltage, second calibration.
V2	R*4	Counts corresponding to B2.
T(3)	R*4	Temperatures (deg. C) for calibration.
VT(3)	R*4	Counts corresponding to T(3).

EDIT PROGRAM

Input Data

Card	Column	Format	Content	Variable
1	1-6	6A1	Location of input tape	TAPEIN
	9-14	6A1	"INPUT"	IOIN
	17-18	I2	Input unit	IUNIT1
	21-22	I2	Input file	NF1
2	1-6	6A1	Location of output tape	TAPOUT
	9-14	6A1	"OUTPUT"	IOOUT
	17-18	I2	Output unit	IUNIT2
	21-22	I2	Output file	NF2
	24-26	I3	Length of output record, 80	LEN2
3	1-5	F6.3	Initial length of cycle, sec.	DELTAT
	8-10	I3	Number of first record to be processed.	IREC
	13-15	I3	Initial value of marker pulse, counts.	MPEAK
	18-20	I3	Initial value of marker base, counts.	LPEAK
	23-25	I3	Acceptable range of marker.	LIMIT
4	1-5	F5.1	Battery voltage.	B1
	6-13	F8.2	Corresponding counts.	V1
	14-18	F5.1	Battery voltage.	B2
	19-26	F8.2	Corresponding counts.	V2
5	1-5	F5.1	Low temperature, degrees C.	T(1)
	6-13	F8.2	Corresponding counts.	VT(1)
	14-18	F5.1	Mid temperature.	T(2)
	19-26	F8.2	Corresponding counts.	VT(2)
	27-31	F5.1	High temperature	T(3)
	32-29	F8.2	Corresponding counts.	VT(3)
6	1-5	F5.1	Flight number.	OUTX(2)
	8-11	F4.0	Payload number.	OUTX(3)
	14-15	I2	Month Telemetry Tape received.	IDATE(1)
	17-18	I2	Day "	IDATE(2)
	20-21	I2	Year "	IDATE(3)

MERGE PROGRAM

Merge - Outline of Chapter

MERGE PROGRAM

Overview

To compute the ozone concentration it is necessary to have the signal from each filter as a function of altitude. In the Merge Program, the edited telemetry data and the radar data are merged on the basis of time (in seconds after the hour) as the common variable. The solar zenith angle is computed and included in each record of the Merge tape. For the lower part of the flight, a table of counts for each filter as a function of temperature is constructed and displayed. The basic structure of the SASC/P&P version of the program is retained, with the addition of the Pedigree records, provision for direct use of the "PASS1" radar tape produced by Code 961 on the Eclipse computer at WFF, determination of counts versus temperature, and other minor, mostly cosmetic, changes.

After mounting and reading the first records on the Edited Ozone Data Tape and the radar tape, the agreement in flight numbers is verified, and up to 3000 records of radar data are read, storing the time and location data in arrays. The solar zenith angle is computed every 60 seconds and stored in another array. Finally, ozone data are read, the altitude for each filter word interpolated from the radar arrays, the solar zenith angle interpolated for the time of this record, and the Merge records written on the output tape.

Radar Data

For flights through 1982 (through Rocoz flight 315) radar data was provided in the form of a "MESUP" tape, with smoothed data for location and velocities given in English units and written in character format on a 7-track tape. This is then converted to metric data in binary files on a 9-track tape by the Radar Program. The resulting "Reformatted Radar Tape" is then suitable as input to the Merge Program.

For flights beginning with Rocoz no. 316 (August 1983), radar data is supplied by CODE 961 at WFF, using the Eclipse computer. This "PASS1" tape gives the location as a function of time, in meters and in degrees of latitude and longitude. The Merge Program has been modified to permit it to read this tape directly.

Both types of tapes from WFF provide time in terms of seconds since launch. These must be converted to seconds since the hour prior to merging with the telemetry data. For MESUP tapes this is done in the Radar Program; for the PASS1 tapes, this is done in the Merge Program. The Merge Program also creates a Pedigree record for the PASS1 tape.

Zenith Angle Computation

In Subroutine ZENITH the solar zenith angle with respect to the Rocoz payload is computed. The apparent right ascension and declination of the sun and sidereal time is provided through DATA5 cards; the location of the payload is obtained from the radar tape. If the radar data is from the MESUP tape, then the location in distance from the launch site must be converted to latitude and longitude. The earth radius required for this conversion is obtained from the latitude of the launch site by the formula (from Basic Physics of the Solar System, Blanco and McCuskey, Addison-Wesley Publ., 1961, p. 83):

$$R0=6378388.(1-3.367\times10^{-3}(\sin(lat))^2+7.1\times10^{-6}(\sin(2\ lat))^2)$$

where R0 is the radius of the earth at the launch site and lat is the latitude of the launch site. The location of the payload is then:

$$latp = lat0 + 57.29578\ rns/R0, \text{ and}$$
$$lonp = lon0 + 57.29578\ rew/(R0\cos(lat0))$$

where latp and lonp are the latitude and longitude of the payload, lat0 and lon0 are the latitude and longitude of the launch site, and rns and rew are the distance (meters) north and east of the launch site. With the appropriate trigonometry, the solar zenith angle as a function of elapsed time and payload location can then be computed. See the program listing for the steps in detail.

The Merge Process

After the radar is stored in arrays, and the solar zenith angle computed for each minute, the Edited ozone data is read in, a record at a time. Provision is included for skipping "bad" sections of data as defined by the input DATA5 cards, although in recent flights this has not been

used. The altitude at the time of each word is interpolated from the radar data and the solar zenith angle at the time of the S0 filter is interpolated from the array of zenith angles and are placed in an output record for the Merge tape. The interpolation is done by Subroutine AITKEN, which uses a four-point scheme. Also on the Merge tape are the time for the S0 filter, the value for each filter during this cycle, the corresponding compensation word values, and information concerning the operation of the photometer, namely, the length of the cycle, the number of telemetry samples (frames) used in evaluating the cycle, the temperature of the photometer, and the battery voltage. Processing is terminated when the end of either the radar data or the Edited ozone data is reached. All values written on the tape are also listed for inspection prior to running the Smooth Program.

Counts vs Temperature

To assist in the determination of the zero offset values for filters S2 and S3 as a function of temperature, Subroutine TMPAVE is called for each Merge record as it is generated. For altitudes less than 45 km, S3 less than 100 counts, and temperatures between 39.74 and -10 degrees C., the counts for S3, S2, and S1 are accumulated in 0.5 degree buckets. At the conclusion of the Merge Program, Entry PRINTM of TMPAVE is called to calculate the averages and print a table of the results. In calculating the average count, the maximum and minimum values available in each bucket are discarded.

MERGE PROGRAM

Common Areas

Only one common area is used, named Z, to transfer the astronomical data, time, and payload location data from MAIN to Subroutine Zenith where they are used in the computation of the solar zenith angle. The resulting solar zenith angle is returned to MAIN via this same common area.

Variable	Type	Content
RH,RM,RS	R*4	Apparent Right Ascension in hours, minutes, and seconds
RACOR	R*4	Change of Apparent Right Ascension, seconds per day
DD,DM,DS	R*4	Apparent Declination in degrees, minutes, and seconds.
DECOR	R*4	Change of Apparent Declination, seconds per day.
SH,SM,SS	R*4	Apparent Sidereal Time in hours, minutes, and seconds.
GMT	R*4	Greenwich mean time in hours.
REW,RNS	R*4	Distances east and north from launch site in meters; if MODE=2, degrees
SOLARZ	R*4	Solar zenith angle, degrees

Input Data

The Merge Program uses either the Reformatted Radar Tape or the PASS1 Radar Tape and the Edited Ozone Data Tape as input; detailed descriptions of these tapes are given in the section on Tape Formats. DATA5 "cards" are used to identify the input and output tapes and files, to state the flight number, and other data needed to construct a Radar Pedigree record, to provide the astronomical data, and to delineate "bad" time periods on the Edited Ozone Data Tape. The Apparent Right Ascension and Declination of the Sun may be obtained from tables for 0h Ephemeris Time in Section C of the Astronomical Almanac and the Sidereal time from tables of Universal and Sidereal Times in Section B.

MERGE PROGRAM

Card	Columns	Format	Content	Variable
1	2-7	6A1	Edited Ozone Data Tape ID	EDITED
	12-16	I5	" " file number	NF
	17-21	I5	" " unit number	IUNIT
2	2-7	6A1	Merge Data Tape ID	MERGED
	12-16	I5	" " file number	NF1
	17-21	I5	" " unit number	IUNIT1
3	2-7	6A1	Radar Data Tape ID	RADAR
	12-16	I5	" " file number	NF2
	17-21	I5	" " unit number	IUNIT2
	25-26	I2	Mode ≠2 reformatted radar =2 PASS1 radar	MODE
4	1-5	F5.1	Rocoz flight number	PED(2)
5	1	I1	Location =1 Wallops Island =2 Churchill =3 Natal =4 Primrose Lake =5 Poker Flats =6 Marambio	LOCA
	28-33	F6.1	Time correction for Edited Ozone, usually 0., seconds	RESTR
	36-38	I3	Begin Edited Ozone record no.	IBEG
	41-42	I2	Number of bad sections of O3 data maximum of 20	NBAD
	43-72	30A1	Rocoz no., date, and time	LAUNCH
6	11-20	F10.2	Apparent Right Ascension, hour	RH
	21-30	F10.2	" " " minutes	RM
	31-40	F10.2	" " " seconds	RS
	41-50	F10.2	" Correction sec/day	RACOR
7	11-20	F10.2	Apparent Declination, degrees	DD
	21-30	F10.2	" " minutes	DM
	31-40	F10.2	" " seconds	DS
	41-50	F10.2	" Correction sec/day	DECOR
8	11-20	F10.2	Sidereal Time hours	SH
	21-30	F10.2	" " minutes	SM
	31-40	F10.2	" " seconds	SS
	41-50	F10.2	Launch time, hour,GMT from which seconds are counted	HOUR
9-28	1-6	F6.1	Start of section to be skipped seconds after hour	BAD1
	9-14	F6.1	End of section to be skipped, sec	BAD2

SMOOTH PROGRAM

Smooth - Outline of Chapter

SMOOTH PROGRAM

Overview

The Smooth Program obtains a value representing the flux through each of the filters at each integer km of altitude. These values are obtained from lines which are a least squares fit to the data in the vicinity of each altitude. If requested, Smooth will do a similar computation for the ratio of flux to that through the SO filter. The results, with related information, are written on the Smooth Tape for input to the Profile Program and also presented in the form of tables and plots for examination and evaluation.

For input, the Smooth Program requires the Merge data tape, values for the zero offsets and their temperature dependence, the minimum acceptable value for the compensation word, and the desired altitude range.

The Smooth Program described here is based on the code supplied by P & P Industries; much of the descriptive material in the SASC "Rocoz Automatic Data Processing User's Guide" of January 1979 is still applicable. The principal changes are fitting to a logarithmic function instead of a polynomial and basing the error on the fit of the data rather than assuming a fixed count. Additions include a test of the compensation word and the use of the temperature coefficient of the zero offset.

MAIN reads the input from DATA5 and from tape, places all of the Merge data on a disk, calls SELECT to identify and process the data in the vicinity of each altitude level, calls LOGFIT to obtain values representative of each altitude level, calls OUTPUT to write the output in tabular form and on a Merge tape, and finally calls GRAPH to plot altitude and intensity.

All tape and disk input and output are through calls to the FTIO package available on the IBM-3081 computer at GSFC Science and Applications Computing Center. Graphs are prepared with the assistance of the WOLFPLOT package likewise available on that computer.

SMOOTH PROGRAM

Selection and Preparation of Data

Initially, the data records are copied from the Merge tape to a disk data set. The data are assumed to be ordered as descending altitude. (For analysis of data from the ascent portion of a balloon flight, this program would require modification.) MAIN chooses integer altitudes, beginning at the top of the altitude range read from DATA5, and calls Subroutine SELECT.

SELECT searches the disk data set for Merge records in the vicinity of this center altitude. Equal numbers of records above and below that for the center altitude are chosen except as limited by the availability of data. Collection of records continues until 100 records are available and the altitude interval is at least two km, or until a maximum of 800 records are collected. The average values for cycle length and the compensation word are computed from the values given in the 99 Merge records centered at the selected altitude. If requested, records are created for which the fluxes for the S3, S2, and S1 filters have been divided by the S0 flux.

Not all of the data are used. Excluded are: records more than 0.5 km above the top of the requested range; filter words with a value of less than 2.0 counts (before zero correction); and filter words for which the corresponding compensation word is below the minimum acceptable value.

Subroutine SELECT corrects all the remaining filter words for zero offset. The zero offsets for the S0 and S1 filters are taken from the records of the laboratory preparation of the payloads, and are usually 0.0. Values for the S2 and S3 filters are obtained from inspection of the Merge listing of the S2 and S3 values at low altitudes. A plot of these data versus temperature usually reveals a non-zero temperature coefficient. Values at two temperatures are placed in DATA5; In SELECT, a temperature dependent offset is computed for each filter word.

Finally, In Subroutine LOGFIT, filter words which are more than two standard deviations from the initial fitted line are discarded, and the constants for the line recomputed. The number of records selected and the number of filter words used are included in the Smooth output record.

SMOOTH PROGRAM

Smoothing and Error Estimates

In Subroutine LOGFIT (based on a program given by P.R.Bevington in Data Reduction and Error Analysis for the Physical Sciences, McGraw-Hill, 1969, p. 104-105, 180-185), the arrays of flux (or ratio to S0) and altitude are fitted to a line of the form

$$\ln I = \ln A + B\,(h - hb)$$

where I is the flux or flux ratio,
A is the value of I corresponding to hb)
h is the altitude, and
hb is the lowest altitude in this array.

Normally each value is given equal weight (MODE = 0), although the code includes provision for other weighting schemes. Values for A, B, and the standard deviation for the array are calculated, and all points which are more than 2 standard deviations from the calculated value of ln I are discarded. The remaining values in the array are used in a recomputation of A, B, corresponding standard deviations (SIGMAA and SIGMAB), and the correlation coefficient.

This treatment is not appropriate for all arrays of data, particularly those at large optical depths for which the signal is essentially constant with altitude. Such arrays are detected by testing DELTA and variance for near-zero values. They are evaluated by obtaining the average value of I over the altitude range and calculating the corresponding standard deviation. Here, also, values of I which are more than 2 standard deviations away from the average are discarded and the average recomputed. When this method is used,the values of A, B, SIGMAA, SIGMAB, and the correlation coefficient in the Smooth Data Record are set to zero.

Subroutine SHAPE is provided which may be called from Subroutine LOGFIT (see the comments immediately after ISN 0053) to list the residuals for all the points of an array.

To provide a measure of the extent of smoothing, the number of points used and the upper and lower altitude limits of each array is included in the Smooth Data Record.

In an earlier version of this program, provision was included for associating an error with each point and using this error in the evaluation of the error in the fitted line. This feature is no longer used, although the error arrays are still present.

SMOOTH PROGRAM

Graphical Displays

Subroutine GRAPH, called from MAIN, uses the WOLFPLOT package to prepare plots of the smoothed value of the signal (or ratio to the SO signal) as a function of altitude at each km, using values from the SAVE array. These are displayed as a printer plot and can also be written to tape for use with higher resolution plotters.

Common Areas

Two named common areas are used, one for the arrays of data associated with a particular altitude level, and the other for the output records.

COMMON/LABEL1/N,S(4,800),H(4,800),ER(4,800)

Found in MAIN and Subroutine SELECT.

N	I*4	Number of points in this fitting interval
S(4,800)	R*4	Number of counts (telemetry) for each of the four filters.
H(4,800)	R*4	Altitude for each of the points (km)
ER(4,800)	R*4	Error associated with each point.

COMMON/LABEL2/SAVE(20,50,4)

Found in MAIN and Subroutine OUTPUT.

SAVE(20,50,4)	R*4	Array containing all output records.

Input Data

The Smooth Program uses the Merge Tape as the source of data from the Rocoz photometer as a function of altitude; the detailed description of this tape is given in the section on Tape Formats. DATA5 "cards" are used to identify input and output tapes and files, run options, altitude range, minimum compensation channel value, and zero offsets to be applied to each filter. The data in terms of telemetry counts is always evaluated; upon request, the data as the ratio to the SO signal is also smoothed.

SMOOTH PROGRAM

The altitude range is obtained from inspection of the listing from the Merge program. The upper limit is the altitude at which the attitude is relatively stable, usually several km lower than the ejection altitude; the lower limit is the lowest integer altitude for which data are available. The minimum compensation word value is usually set equal to one-half the minimum compensation value observed, such that data more than about 60 degrees from the Rocoz optical axis can be discarded. Zero offsets for S0 and S1 are obtained from laboratory measurements; for S2 and S3, the data at the lower altitudes are plotted as a function of temperature, a straight line drawn, and values read at two temperatures.

Card	Columns	Format	Content	Variable
1	1-6	6A1	Input Tape Identification	TAPEIN
	9-10	I2	Input Tape File number	NF
	13-14	I2	Input Tape Unit	IUNIT
2	1-6	6A1	Output Tape Identification	TAPOUT
	9-10	I2	Output Tape File number	NF2
	13-14	I2	Output Tape Unit	IUNIT2
3	1-2	I2	Type of weighting, usually 00	MODE
	45	I1	=0: no ratios; =1 divide by S0	LRAT
4	1-6	F6.1	Zero offset (counts) for S0	OFF(1)
	9-14	F6.1	Zero offset (counts) for S1	OFF(2)
	17-22	F6.1	Zero offset (counts) for S2	OFF(3)
	25-30	F6.1	Zero offset (counts) for S3	OFF(4)
5	1-6	F6.1	Temperature (deg. C) for above	TA
	9-14	F6.1	Temperature for next two values	TB
	17-22	F6.1	Zero offset for S2 at 2nd temp.	S2B
	25-30	F6.1	Zero offset for S3 at 2nd temp.	S3B
6	1-4	F4.0	Rocoz flight number	PED(2)

PROFILE PROGRAM

Profile - Outline of Chapter

PROFILE PROGRAM

Overview

The Profile Program obtains data for the Rocoz photometer from the Smooth tape, reads selected values for the Datasonde, the ECC sondes, and the Dobson spectrophotometer, and reads filter calibration values and related tables. The program uses these data in the computation of ozone profiles for each filter and also creates a composite profile based on data from all the filters. With the air temperature and pressure data available from the Datasonde and the ECC sonde, the ozone profile is then be expressed in units such as partial pressure and mixing ratios. Various aspects of the data set are examined for self-consistency. Finally, the basic data and the derived profiles are written on a Profile tape, intended as the archival product of the flight. The Profile Program does not create plots of the data but does include a number of printed tables. These functions are distributed among the 21 Subroutines as follows:

(1) Assembly of the Rocoz data and correlative observations with the required calibration data.
(CARDS, TAPE, INARRY, SHAPE)

(2) Computation of related data.
(MODEL, DATSND, SECANG)

(3) Computation of ozone profiles and composite profile.
(OZDENS, SLANTA, ALFEFF, COMPST)

(4) Evaluation of Rocoz data set.
(CHECKS, OVERLP, LINFIT)

(5) Computation of related parameters and display of observations in tables.
(RELATD, PRTWRT)

(6) Placement of the ozone profiles and related data on the Profile Tape.
(TAPWRT)

(7) Display of various arrays as desired for test and diagnostic purposes.
(PRTPRF, PRTPED, CFTWRT, PRTSAV)

The general structure is shown in the Block Diagram of the Profile Program.

PROFILE PROGRAM

Brief Description of Each Subroutine

CARDS reads set-up information (e.g. altitude range for each filter) and correlative data from the Datasonde, the Dobson spectrophotometer, and the ECC sondes.

TAPE reads Rocoz data from the Smooth tape.

MODEL contains an ozone model, with derived overburdens. The present Krueger-Minzner mid-latitude model should be replaced with one dependent on latitude and season.

DATSND calculates densities and pressures corresponding to the datasonde temperature profile.

SECANG obtains the secant of the solar zenith angle for each altitude level; for angles over 60 degrees, the Chapman function is computed instead.

OZDENS computes ozone density and column content for each altitude level for each filter, based either on observed fluxes or their ratio to the SO flux.

SLANTA computes the slant air mass (atmospheres) and the slant ozone overburden (atm-cm) at the three altitude levels under consideration in OZDENS.

ALFEFF computes effective ozone absorption and Rayleigh scattering coefficients, given filter transmission, temperature, slant overburdens, and ozone absorption coefficients.

INARRY obtains solar flux, diffuser transmissions, detector response, Rayleigh scattering coefficients, and ozone absorption coefficients from external data sets, determines range of wavelengths for which data are available, and sets up these arrays for use in computing the effective absorption coefficient.

SHAPE obtains the measured filter transmission.

COMPST obtains a weighted (inversely to associated error) of the available Rocoz ozone data at each altitude level. ECC data are not included.

CHECKS tests the internal consistency of the data related to this profile by (1) comparing ozone values at a given level from different filters, (2) computing

ozone overburden from the Composite Profile as a function of altitude and comparing it with the Model, (3) comparing the measured ozone densities with those from the Model, (4) comparing the (Rocoz+ECC) column content with that measured by the Dobson instrument, (5) comparing various estimates of the rate of change of ln I, (6) comparing the variation of the intensity in the compensation channel with that expected due to changes in the solar zenith angle and scattering, and (7) computing the drag coefficient as a function of altitude (large variations may indicate a defective Starute or errors in the radar altitude data).

OVERLP called by CHECKS to assemble and analyze the ozone densities at each altitude level.

LINFIT called by OVERLP to compute a straight line fit to the data at each level.

RELATD incorporates air temperatures and pressures, and computes ozone values within standard layers and at standard pressure levels.

PRTPRF displays the contents of the COMMON/PROFLS/ which includes the Datasonde, the ECC, and the model profiles.

CFTWRT displays the contents of the arrays generated by INARRY and FSHAPE, used in the computation of effective absorption coefficients.

PRTPED displays the contents of the Pedigree array.

PRTSAV displays the contents of the SAVE array for each filter, listing the ozone profile and values used in its derivation.

PRTWRT formats arrays for hard copy printout with appropriate labels and column headings, including the arrays generated by RELATD.

TAPWRT writes the data selected for archiving on a tape.

PROFILE PROGRAM

Observations and Supplied Values

In the analysis of observations from a Rocoz photometer, additional data are used: various constants, an air temperature profile from a Datasonde, air pressure and ozone profiles from an ECC sonde, total ozone from a Dobson spectrophotometer, and a model ozone profile. The flight plans require that a Datasonde and two ECC sondes be launched close to the time of the Rocoz launch, that all sondes be tracked by radar, and that the Dobson spectrophotometer be operated according to its usual schedule. The raw data from the Datasonde, the ECC sonde, and from the Dobson spectrophotometer are analyzed by the responsible groups, and the observations are provided in terms of the various atmospheric parameters. Data selected from those reports are entered into the Profile program where they are made ready for use with the Rocoz data.

This section of the document discusses the selection and use of the constants and observations. The precise formats for the input of data are found in "Profile Program - Input Data" and in the chapter on Tape Formats. Within the Profile Program, these observations are stored in COMMON/PROFLS/ in arrays which are described in detail in the section on Common Areas.

Constants

Used in the conversions of units, hypsometric computations, estimation of acceleration due to gravity, computation of dynamic viscosity, etc., are a number of constants. The values for Avogadro's number, the gas constant, the mean molecular weights of air and ozone, the volume of an ideal gas, Sutherland's constant, and beta are those given in the U.S.Standard Atmosphere, 1976. The acceleration of gravity at 45 degrees latitude is from the Smithsonian Meteorological Tables (R.J.List, ed., 1968, p. 488).

Avogadro's Number	6.022169×10^{26} kmol^{-1}
gas constant, R*	8314.32 N m/(kmol K)
acceleration of gravity at sea level at 45 deg latitude	9.806160 m sec^{-2}
mean molecular weight of air	28.9644 kg/kmol
mean molecular weight ratio, ozone/air	1.65714
volume of ideal gas at STP	22.4136 m^3/kmol
Sutherland's constant	110.4 K
beta	1.458×10^{-6} kg/(s m K$^{1/2}$)
degrees to radians	0.01745329 rad/deg

PROFILE PROGRAM

Dobson Observations

At the Wallops Flight Facility, total ozone is measured by use of a Dobson Spectrophotometer. Occasionally, at remote sites, other instruments may be used which observe total ozone at similar wavelengths, such as the SenTran filter photometer or the Brewer Ozone Spectrophotometer.

To be entered into the Profile Program (Subroutine CARDS) are total ozone values observed before and after the Rocoz flight; the program refers to these as AM and PM data. The date of observation and two values of total ozone are stored in words 2-4 of the type -501. pedigree record (PED(x,6)). Values of total ozone range from about 200 to 650 Dobson Units; a Dobson Unit is intended to be equal to a milliatm-cm of ozone but it is recognized that the effects of non-ozone absorbers and scatterers may, under some circumstances, be inseparable from that of ozone.

In Subroutine CHECKS the ozone column content as measured by the Dobson spectrophotometer is compared to the column content indicated by the combined Rocoz-ECC ozone profile.

Datasonde Observations

The air temperature profile above about 20 km can be obtained from a Datasonde, a small rocket payload consisting of a temperature sensor and a telemetry transmitter suspended from a decelerator, tracked by radar as it transmits temperature data during its descent from the vicinity of 60 km. If only one Rocoz flight is planned on a given day, one Datasonde is usually scheduled with a launch time within one hour of the Rocoz launch. If multiple Rocoz flights are scheduled, Datasonde launches are usually scheduled shortly prior to the first Rocoz launch and shortly after the last Rocoz. Data from the sondes are reduced at the Wallops Flight Facility, with scientific quality control under the cognizance of F. Schmidlin. The reduced data is in terms of air temperature as a function of altitude and also includes the 2-sigma error value associated with each point.

To be entered into the Profile Program (Subroutine CARDS) are information concerning the flight, the temperature profile, and independently observed air pressure and air temperature at a "base" altitude. Identification of the flight (an 8-character Flight Number, date and time of flight), are stored in words 5-8 of the type -502. pedigree record (PED(x,7)). A base altitude and air pressure derived from the independent observations made by the ECC sonde are

entered and stored in words 9 and 10 of PED(x,7) for use in deriving air pressures and densities at the datasonde altitudes. The time in minutes (MDEL) between the Datasonde and Rocoz launches is entered for use in estimating the temperature error. The altitude, air temperature, and 2-sigma temperature error are entered at integer km altitudes, beginning at the highest altitude for which a temperature observation is available. The temperatures are stored in the remainder of the type -502. pedigree record and in as many type -503. records as are necessary. For use later within the Profile Program, the base altitude, air temperature, and air pressure are stored in DSB in COMMON/PROFLS/, and the altitude, temperature, and temperature error are in SONDE, also in COMMON/PROFLS/. The index for the location in SONDE of the lowest altitude level of the profile is noted and stored as MXSND. Altitudes are stored in km; temperatures in kelvin.

Because the real interest is in the temperature at the time of the Rocoz flight, an error due to atmospheric variability is added to the instrumental error. The formula used in Subroutine CARDS, from F.Schmidlin, (J.Geophys.Res., 86,9599-9603, Oct.20,1981) is

delT(Rocoz) = SQRT (0.5 * Terr * Terr + B * MDEL)

where

- delT(Rocoz) is the one-sigma error in temperature for the time of the Rocoz flight,
- Terr is the two-sigma error of the Datasonde temperature,
- B is 0.32 above 52.5 km; 0.19 below 52.5 km, and
- MDEL is the difference in minutes between the two launch times, or a maximum of 100.

If the flight report does not include estimated errors in the temperature, the instrument errors given by Schmidlin (see above) may be used. DelT(Rocoz) is stored in SONDE (5,x) and used later in Profile in the estimation of the error associated with the expression of the ozone content in terms of partial pressure or mixing ratios.

In Subroutine DATSND, a profile of air pressure and density is derived from the datasonde temperature profile and the base values of pressure through use of the hypsometric equation:

$$P(alt) = P(base) * \exp \frac{(-G * M * (H - Hb)*1000)}{(R * T)}$$

where

- P(alt) is the pressure (mbar) at altitude, H
- P(base) is the pressure (mbar) at a base altitude, Hb,

G is the acceleration of gravity at the latitude of observation and altitude H,
M is the mean molecular weight of dry air at sea level, = 28.9644 kg/kmol,
R is the gas constant, = 8314.32 N m/(kmol K)
T is the average temperature (kelvin) between H and Hb, = 0.5 (T(alt) + T(base)),
H is the altitude (km) for P(alt), and
Hb is the altitude (km) for P(base).

The acceleration of gravity at the latitude of observation is computed according to the Smithsonian Meteorological Tables (6th ed., 1968, p.488, R.J.List,ed.). That is at sea level and 45.00 degrees latitude,

$G(45) = 9.806160\ m/s^2$.

At any other latitude,

$G(lat) = G(45)(1 - 0.0026373 \cos(2{*}lat) + 0.0000059 \cos^2(2{*}lat))$.

To adjust for the altitude of observation,

$G(alt) = G(lat)\ R0^2/(R0+H)^2$,

where R0 is the radius of the earth at the latitude of observation and is given by

$R0 = 6378.388(1 - 0.0033670 \sin^2(lat) + 0.0000071 \sin^2(2{*}lat))$ km,

from the International Ellipsoid (Basic Physics of the Solar System, p.83, V.M.Blanco and S.W.McCuskey, Addison-Wesley, 1961).

Densities are then derived from the air temperature and pressures as follows:

D(alt) = (P(alt)*100.) * M / (T(alt) * R), where

D(alt) is the density at each altitude level (kg/m^3),
P(alt) is the pressure at each altitude level (mbar), (1 pascal = 100 mbar)
T(alt) is the temperature at each altitude level (kelvin),
M and R are the mean molecular weight and the gas constant as defined above.

These data (altitude, temperature, pressure, density, and temperature error) are stored in the array, SONDE(5,70). In Subroutine SLANTA, SONDE is used in the computation of slant air mass above a given altitude and its rate of change with altitude. In Subroutine ALFEFF, SONDE is used in the computation of an average temperature, weighted by air density for the ten km above a given altitude, for use in obtaining the appropriate ozone absorption coefficient. In Subroutine OZDENS, temperature, temperature error, and pressure are stored in the SAVE arrays with the corresponding ozone data and are used in OZDENS, COMPST, and RELATD to convert ozone density to ozone partial pressure,

the expression of ozone content in terms of mixing ratios and layer content, and in the estimation of errors of these derived ozone values.

ECC Sonde Observations

One or more ECC sondes are launched near the time of the Rocoz rocket launch, usually within an hour, before and after. This is a small payload suspended from a weather balloon, consisting of a standard rawinsonde with an ECC package attached. The data from the electrochemical cell (ECC) is inserted into the stream of rawinsonde data, with readings initiated by each successive closure in the microbaroswitch. The rawinsonde provides data on air pressure, air temperature, and humidity, with humidity data limited to the lower troposphere. Maximum altitude is limited by the burst altitude of the balloon, usually above 30 km. Altitudes are derived from the observations of temperature and pressure via the hypsometric equation; recent ECC flights have been radar tracked and these altitudes should be more accurate, especially at the higher levels. The ECC ozone values, expressed as partial pressure of ozone, have their greatest accuracy in the lower stratosphere, from the tropopause to no more than about 30 km. Some profiles show large excursions, usually due to the normal "layer-cake" structure of the ozone mixing ratios; occasionally there may be an excursion due, apparently, to the release of bubbles from the walls of the cell. A standard data reduction procedure for ECC's is in place at the Wallops Flight Facility, and reports are issued in a standard format, providing data at the microbaroswitch standard pressure levels as well as at each minute in flight.

In Subroutine CARDS of the Profile program, provision is made for entering data from two ECC sondes. The flight identification (8 characters) and launch date and time are stored in type -506. pedigree records. A "tie-on altitude" at an integer km level is chosen near the base of the Rocoz ozone profile and the corresponding ozone content (atm-cm) from ground level to this altitude, readily obtainable from the standard ECC data product, are likewise entered into Subroutine CARDS and stored in the -506. record. Next are entered data for 19 selected standard pressure levels, namely at 1000, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 60, 50, 40, 30, 25, 20, 15, and 10 mbars. These data (altitude in km, ozone pressure in nanobars, air pressure in millibars, and air temperature in kelvin) are stored in the array, ECC, starting with the data for the 1000 mbar level as well as in the the type -506. and its continuation, type

-507. pedigree records. Finally, Subroutine CARDS reads data for the ozone column content (atm-cm) from the ground up to 250, 125, and 62.5 mbar pressure levels storing these three values in ECCLM, for use in Subroutine RELATED. The ECC observations are generally the source of information for "base" values for use with the Datasonde profile.

For altitudes below the range covered by the Datasonde temperature-pressure profile, the Profile program uses air temperatures and air pressures from the ECC data. In Subroutine SLANTA air density is used in the computation of the slant air mass above various altitude levels. In Subroutine ALFEFF, air temperatures and densities are used in the computation of a weighted temperature so that a temperature-corrected ozone absorption coefficient may be obtained. In Subroutine OZDENS, air temperatures and air pressures are placed in the type 2xx. data records; the one-sigma error in ECC temperature is assumed to be 1.0 kelvin and the error in ECC pressure is assumed to be 0.7 mbar. In Subroutine CHECKS, the ozone column content between the ground and the "tie-on" altitude is added to that inferred from the Rocoz photometer, and the sum compared to the column content observed by the Dobson spectrophotometer. Finally, in Subroutine RELATD, tables are prepared for the user's convenience which include the ECC ozone content for standard layers and pressure levels.

Rocoz Photometer Observations

Raw data from the Rocoz photometer telemetry tape are digitized at the Wallops Flight Facility and processed by the RAW, EDIT, MERGE, and SMOOTH programs resulting in a SMOOTH tape, which is the input tape to the PROFILE program. The radar track of the photometer is likewise digitized at the Wallops Flight Facility, processed by the RADAR program, and combined with the photometer data in the MERGE program. The SMOOTH tape provides photometer current (counts) as a function of altitude and related information such as calibrations for instrument temperature and battery voltage, location of the sun, launch site and time, solar zenith angle, and noise content. Details of the tape formats and functions of the various programs are given in other sections of this document.

The SMOOTH tape is read by Subroutine TAPE. The Pedigree records are stored in the array, PED, for output to the Profile tape. The photometer data are placed in the array, SMOOTH(I,J,K), such that all data for S3 have subscript K=1, for S2, K=2, ...for S3/S0, K=4,...and for S1/S0, K=7. In Subroutine SECANG, the secant/Chapman-function is computed

for the solar zenith angle at each altitude; details of this computation are given in the next paragraph. In Subroutine OZDENS the photometer values for two-km thick layers are interpreted in terms of the ozone density at the center of that layer and stored in the array SAVE. The method of computing ozone is given in the section on Ozone Algorithm. After all the data for the filter under consideration have been interpreted in terms of ozone densities, the results in SAVE are stored in the corresponding SMOOTH area for use later in the Profile program.

To convert column content from that in the slant path between the photometer and the sun to the corresponding vertical column content, the slant path content can be divided by the secant of the solar zenith angle. This is exact for a plane parallel atmosphere, but, for a spherical atmosphere, leads to error, particularly for solar zenith angles larger than 60 degrees. In Subroutine SECANG, if the cosine of the solar zenith angle is less than 0.5, approximations to the Chapman function are used for computation of the ratio of the vertical path to the slant path. The basic equations for the Chapman function and a table of values is given by S. Chapman (Proc. Phys. Soc., London, 43, 483-501, 1931); this discussion is extended and updated tables given in S. Chapman (Proc. Phys. Soc., London, B, 66, 710-712, 1953); a simplified form for the computation is provided by Fitzmaurice (Appl. Optics, 3, 640, 1954); the Fitzmaurice approximation was expressed in terms of a series expansion by K. Klenk of Systems and Applied Sciences Corporation (SASC), and described in their Sept. 1980 monthly report on Contract no. NAS5-25346, Task no. 41. The SASC expression for the Chapman function is

$$Ch = (X\,\pi/2)^{\frac{1}{2}}\,(a_1\,t + a_2\,t^2 + a_3\,t^3 + a_4\,t^4 + a_5\,t^5)$$

with

$$X = (Re + h)/H, \quad t = 1/(1 + pY), \quad Y = (X/2)^{\frac{1}{2}} \cos z$$

where

- Ch is the value of Chapman function,
- Re is the radius of the earth, km,
- h is the altitude above the spheroid, km,
- H is the scale height of component of interest, km, for both ozone and air, set to 5.0,
- z is the zenith angle,
- π = 3.141593,
- a_1 = 0.254829,
- a_2 = -0.284496,
- a_3 = 1.421413,
- a_4 = -1.453152,
- a_5 = 1.061405, and
- p = 0.327591.

The above expression is used if the cosine of the zenith

angle is less than 0.2 (i.e. for angles greater than 78.5 degrees). For zenith angles between 60 and 78.5 degrees, a more simple approximation is used, namely,

$$Ch = (1. - T (1.- 3 T (1 - 5 T)))/\cos z$$

with

$$T = 0.5 Y^{-2}.$$

In the following table are given values for a precisely computed Chapman function at X=1000. for several different zenith angles and the values as computed by the the above approximations. The precisely computed values are inferred from the tables provided by W. Swider Jr. and M. E. Gardner (On the Accuracy of Certain Approximations for the Chapman Function, AFCRL-67-0468, August 1967, 14p, Air Force Cambridge Research Laboratories, L.G.Hanscom Field, Bedford, Massachusetts)

Values of Chapman Function

zenith angle degrees	Chapman X=1000.	this X=1000.	this X=1480.	secant z
60.	1.994	1.992	1.994	2.000
70.	2.902	2.899	2.905	2.924
80.	5.590	5.598	5.643	5.759
90.	39.648	39.633	44.874	-----

Note that X=1480. corresponds to an altitude of 40 km and a scale height of 5 km.

Radar Tracks

Data for the radar track are digitized at the Wallops Flight Facility, smoothed by the Code 970 Eclipse computer (MESUP tape), converted to metric units by the RADAR Program, and merged with the Rocoz photometer data in the MERGE Program. Error in altitude for data from the WFF radars is assumed to be 10 m and is used in Subroutine OZDENS in the estimation of error in d(ln I)/dh. Altitude error for observations at remote sites is probably larger.

Model Ozone Profile

A model ozone profile is provided by Subroutine MODEL for use in Subroutine SLANTA in its estimate of the ozone column above the top of the ozone profile from the Rocoz data under consideration, and, in Subroutine CHECKS, for comparison with the observed Rocoz ozone profile.

PROFILE PROGRAM

Number densities (molecules m^{-3}) are from the mid-latitude, Northern hemisphere model provided in the U.S.Standard Atmosphere, 1976, based on an analysis by A. Krueger and R. Minzner and are stored in a DATA statement. Values are interpolated so as to provide an ozone number density at each km from 11 to 70 km. Subroutine MODEL assumes an overburden above 70 km of 5.35×10^{-6} atm-cm and infers the overburden at lower altitudes from the model density profile. To obtain the column content, the density is multiplied by 1.0×10^{-5} x 22.4136 liters per mole / 6.022169×10^{26} (Avogadro's number) and added to the column content at the previous altitude level. The total column above 0 km is 0.345 atm-cm. A more elegant method would be to use tables derived from satellite data to obtain a "first guess" profile appropriate for the latitude, season, and the column content as observed by the Dobson spectrophotometer.

Effective Ozone Absorption Coefficient

Computations

Given values for the content of ozone and air in the slant path to the sun, characteristics of the filter, and the necessary reference tables, Subroutine ALFEFF returns values for the effective ozone absorption coefficient and the effective scattering coefficient.

The filter shape may be expressed in terms of its transmission as a function of wavelength. Such measurements have been made, in the past, at the Naval Weapons Center (NWC) at China Lake, California, and are now done at the Wallops Flight Facility. These tables may be read by Subroutine SHAPE and used in Subroutine ALFEFF to compute Aeff. The formulae are similar to those used by NWC as given by M. E. Hills and C. A. Flanagan (Calculation of Effective Ozone Absorption Coefficients for a Rocketborne Ozonesonde, NWC TP 5904, 41 pp, Naval Weapons Center, China Lake, Calif., March 1977). That is,

$$\text{Aeff} = \frac{-1}{X} \ln \frac{\text{sum } I0(L)\ Q(L)\ S(L)\ F(L)\ \exp(-A(L)\ X - B(L)\ M)\ dL}{\text{sum } I0(L)\ Q(L)\ S(L)\ F(L)\ \exp(-B(L)\ M)\ dL}$$

or for slant path ozone less than $1.\times10^{-5}$ atm-cm and slant air mass less than 0.01 atm, i.e., no overburden,

$$\text{Aeff} = \frac{\text{sum } I0(L)\ Q(L)\ S(L)\ F(L)\ A(L)\ dL}{\text{sum } I0(L)\ Q(L)\ S(L)\ F(L)\ dL}$$

where
- L is wavelength, at 0.1 nm intervals,
- I0 is the flux of the sun at zero optical depth,
- Q is the detector responsivity,
- S is the diffuser transmission,
- F is the filter shape,
- A is the ozone absorption coefficient, per cm, base e,
- X is the slant path ozone overburden, atm-cm,
- B is the scattering coefficient, per atm., base e, and
- M is the slant path air mass, atm.

The ozone absorption coefficient is a function of temperature, particularly for wavelengths longer than about 270 nm. In Subroutine ALFEFF, a weighted temperature is computed, dependent on the air density for ten km above the altitude under consideration, and the ozone absorption coefficient interpolated at each wavelength from tables of the ozone absorption coefficient at several different temperatures.

PROFILE PROGRAM

To obtain an effective scattering coefficient, a similar equation is used, that is,

$$Beff = \frac{-1}{M} \ln \frac{\text{sum } I0(L)\ F(L)\ Q(L)\ S(L)\ \exp(-B(L)\ M)\ dL}{\text{sum } I0)L)\ F(L)\ Q(L)\ S(L)\ dL} .$$

The Solar spectral flux, Rayleigh scattering coefficients, ozone absorption coefficients, diffuser transmission, detector responsivity, and filter transmission tables are stored on disk and read by Subroutine INARRY. The diffuser transmission and detector responsivity are assumed to be the same for all photometers. The filter transmission is measured for each of the four filters in each photometer, and must be supplied for each flight. The filter shapes, for the flights up through Rocoz no. 315, are expressed only in terms of coefficients, and are read by Subroutine CARDS. For later flights, detailed filter shapes are also available, and may be read by Subroutine SHAPE.

Subroutine INARRY expects the disc data sets to have an initial 80-byte header followed by 1000 real numbers corresponding to wavelengths of 240.1 to 340.0 nm at 0.1 nm intervals. The header consists of 64 characters followed by 4 real (R*4) words. The real numbers are the range of wavelengths and the temperature, as applicable. The first part of the character string should identify the contents, including the parameter, the observer, and the date, as appropriate.

If McBride coefficients are available (not equal to zero), then Subroutine ALFEFF uses an approximation developed with NWC describing the dependence of Aeff on the ozone content of the slant path, namely,

$$Aeff = A0 + 2.\ A1\ X + 3.\ A2\ X^2$$

where
- X is the slant path ozone overburden, atm-cm,
- A0 is the effective ozone absorption coefficient for no overburden, and
- A1 and A2, as well as A0, are coefficients describing the change as a function of overburden.

The three coefficients, A0, A1, and A2, are obtained by computing Aeff for various overburdens and fitting the results to a polynomial, assuming that the effects of scattering on Aeff are negligible above about 20 km. The coefficients are part of the card (DATA5) input and are computed prior to running the PROFILE program.

PROFILE PROGRAM

The effective scattering coefficient, Beff, is set equal to value of B provided by the NWC analysis and is assumed to be constant over the range of air masses encountered in the reduction of the Rocoz observations. It is estimated that that the error due to this assumption is no more than 2% for altitudes above 20 km. The NWC analysis also provides the center wavelength and width at half height for each filter. These may be used, with the assumption of a gaussian filter shape, to estimate the effect of the temperature dependence on the Aeff.

Solar Flux

For both the solar flux and the ozone absorption coefficient, several different sets of data are available. For flights prior to no. 315, a "McBride" solar flux was used at the Naval Weapons Center (China Lake, California) in the computation of effective absorption coefficients for each filter. This is based on the average values for 0.1 nm intervals of the Furukawa compilation (Furukawa, P.M., P.L.Haagenson, and M.J.Scharberg, A composite, High-Resolution Solar Spectrum from 2080 to 3600 A, NCAR-TN-26, 55p, 1967, National Center for Atmospheric Research, Boulder, Colorado) and is available as a disc data set for use with the Profile Program.

Rayleigh Scattering Coefficient

The Rayleigh scattering coefficient as a function of wavelength was likewise assembled by Dr. McBride and is available as a disc data set for use with the Profile Program.

Ozone Absorption Coefficients

The effective absorption coefficients computed by Dr. McBride were based on ozone absorption coefficients measured by E.C.Y.Inn and Y. Tanaka (Ozone Absorption Coefficients in the Visible and Ultraviolet Regions, Ozone Chemistry and Technology, Advances in Chemistry Series No. 21, pp263-68, 1959) for wavelengths shorter than 272 nm and from measurements at -44 C. reported by E. Vigroux (Contribution á l'êtude expêrimental de l'absorption de l'ozone, Ann.Phys., 8, 709-62, 1953) for wavelengths longer than 290 nm, with an appropriate interpolation at intermediate wavelengths. This data set is available on disc for use by Subroutine INARRY. INARRY expects three sets of ozone

absorption coefficients at three different temperatures (such as are expected to be available from the work of A. Bass). In Subroutine ALFEFF interpolation is made to obtain the ozone absorption coefficient corresponding to the air temperature weighted according to air density.

Diffuser Transmission

The transmission of the three stacked diffuser plates as a function of wavelength was measured a number of years ago, and the resulting curve has been used for all filters characterized by Dr. McBride. This is available as a disc data set for input to the Subroutine INARRY.

Detector Responsivity

The response of the detector was obtained many years ago (from the manufacturer ?), was used by Dr. McBride in his analyses, and is available as a disc data set for input to the Subroutine INARRY.

Filter Transmission

The shape of each filter (with the nickel sulfate hexahydrate crystal) is measured by means of a Cary 14 Dual Beam Spectrophotometer, and the measured transmission is used by Subroutine ALFEFF in the computation of the effective absorption coefficient.

For the filters calibrated in Dr. McBride's laboratory at the Naval Weapons Center(NWC), an NWC analysis provides the center wavelength and half-width, the effective absorption coefficient with no overburden (A0), and the coefficients, A1, A2, and B.

For the filters calibrated at the Rocoz Test and Calibration Laboratory at the Wallops Flight Facility, Subroutine SHAPE reads the data set containing the measured spectral transmission, and Subroutine ALFEFF computes effective ozone and scattering coefficients as a function of air temperature and air and ozone overburdens.

PROFILE PROGRAM

Ozone Profile

Basis of Ozone Algorithm

The technique for converting the observed solar flux as a function of altitude to ozone content as a function of altitude was developed by Arlin Krueger (NASA, Goddard Space Flight Center) for use with his Rocoz photometer and was described in detail by Eugene Shaffer (Systems and Applied Sciences Corporation) in a draft report. This discussion is based primarily on that report, but adds the details of its implementation in the Profile Program.

The reduced Rocoz data consist of a flux of ultraviolet light in four different wavelength bands as a function of altitude. The wavelength bands are chosen over a range of ozone absorption coefficients. To compute the ozone profile, the following assumptions are made:

1. Dust particles cause a negligible attenuation of the direct sunlight.
2. No other absorbers are present in the stratosphere for the four wavelength bands.
3. Above 20 km, the diffuse component of the sunlight can be ignored.

With the above assumptions in mind, the intensity of the sunlight as a function of altitude can be written, using Beer's law, as

$$I(L,h) = I(L,\infty) \exp\left[A(L)u(h) - B(L)m(h)\right] \qquad (1)$$

Where:
- $I(L,h)$ is the intensity at height h,
- $I(L,\infty)$ is the intensity at top of the atmosphere,
- $A(L)$ is the ozone absorption coefficient,
- $u(h)$ slant path ozone from h to the sun,
- $B(h)$ Rayleigh scattering coefficient,
- $m(h)$ optical air mass between h and the sun,
- L is wavelength, and
- h is altitude.

Equation (1) can be rewritten as

$$\ln I(L,h) - \ln I(L,\infty) = -A(L)u(h) - B(L)m(h).$$

An expression for the ozone concentration at each height interval can be derived by differentiating the above expression with respect to altitude.

$$d\,\frac{\ln I(L,h)}{dh} = -A(h)\,\frac{du(h)}{dh} - B(h)\,\frac{dm(h)}{dh} \qquad (2)$$

PROFILE PROGRAM

The monochromatic ozone absorption coefficient and Rayleigh scattering coefficient must be replaced by effective coefficients which are now a function of the slant path total ozone and the air mass amounts.

A(L) is replaced by Aeff(u,m)
B(L) is replaced by Beff(u,m)

Effective coefficients are used because the optical filters have bandwidths wide enough that the wavelength dependence on various input parameters must be recognized. The slant path ozone amount, (u), and the optical air mass amount, (m), modify the spectral shape of the solar flux as a function of height.

The effective coefficients are substituted into equation (2) to yield

$$\frac{d \ln I(L,h)}{dh} = -Aeff \frac{du}{dh} - \frac{d(Aeff)}{du} \frac{du}{dh} u - Beff \frac{dm}{dh} \quad (3)$$

Equation (3) is rewritten to represent du/dh, the total amount of ozone in the height interval.

$$\frac{du}{dh} = \frac{-1}{Aeff + \frac{d(Aeff)}{du} u} \left\{ \frac{d (\ln I(L,h))}{dh} + Beff \frac{dm}{dh} \right\} \quad (4)$$

Finite differences may be substituted for the derivatives, and equation (4) now can be solved iteratively for ozone amounts at any height level in the range of the Rocoz data.

The implementation of this solution in the Profile Program makes use of the following:

- The magnitude of the solar flux at the wavelengths of interest at any given altitude is taken to be proportional to the current from the photodiode detector as adjusted by the Rocoz electronics for variations in the flux at longer wavelengths entering the photometer, that is, I is proportional to the number of counts transmitted by the telemetry system for any particular filter. The constant of proportionality is not important since the difference of the logarithms is the parameter that is used.

PROFILE PROGRAM

- One way to represent the effect on the ozone absorption coefficient is to use a quadratic function:

$$Aeff(u,m) = A0 + A1\ u + A2\ u^2 + B1\ m + B2\ m^2$$

At typical rocket heights (20-60 km) the fourth and fifth terms in equation (3) are negligible due to the small air mass and are ignored in this discussion. The effective Rayleigh scattering term can be considered a linear function of the optical air mass. For heights of 20 to 60 km we represent the effective Rayleigh scattering as a constant, which for the filters in use here will have an error of no more than 2%. The constants in the quadratic equation may be calculated through use of the measured filter shape, solar spectrum, ozone absorption coefficients, Rayleigh scattering coefficients, and the spectral response of the Rocoz photometer, together with various assumed ozone and air overburdens. These constants have been calculated by Dr. William R. McBride for the filters that have been calibrated at the Naval Weapons Center at China Lake, California, and are available for use in the analysis of the Rocoz data for flights through 1982.

- It is noted that dm/dh is simply (air density x secant solar zenith angle).

- The Profile Program will process the Rocoz photometer data in terms of the observed count for each of the four filters (S3, S2, S1, and S0) or in terms of the ratio to the S0 filter (S3/S0, S2/S0, S1/S0). The use of ratios is preferable if there is appreciable common mode noise and/or if there is a change in the responsivity of the photometer as a function of time in in flight.

- The range of altitude for each filter is chosen prior to running the Profile Program; it generally corresponds to optical depths between 0.05 and 3.0 and depends on the availability and quality of data, that is, both radar and telemetry data must be available, telemetry dropouts must be minimal, the attitude of the Rocoz must be reasonably stable, and the solar zenith angle should be less than 60 degrees. Data for solar zenith angles up to about 80 degrees can be processed, but the accuracy of the resulting ozone densities becomes increasingly uncertain.

PROFILE PROGRAM

Implementation of the Ozone Algorithm

The Rocoz data is interpreted in terms of ozone densities by the Profile Program in subroutine OZDENS. The evaluation involves three altitude levels, spanning a total of 2 km, namely, top (T), center (C), and bottom (B), with the differentials evaluated for a layer centered at C. In the initial evaluation, estimates are used for ozone densities and ozone overburdens. After the initial evaluation of the ozone density at C, these estimates are updated and the ozone density at C recomputed until the change in the ozone density compared to its previous value is less than 0.1 %.

The steps necessary to interpret the input data are as follows:

1. The top (ALTT), center (ALTC), and bottom (ATLTB) altitudes are identified, beginning with ALTT in km as provided in the array TOP, and ALTC and ALTB one and two km lower, respectively. After the determination of the ozone density at ALTC, ALTT, ALTC, and ALTB are each decremented by one km, ending with the layer for which ALTB corresponds to the value given in the array BASE.

2. SLANTA is called to provide the slant air mass (ASLTT, ASLTC, ASLTB) above each of the three altitudes and its rate of change evaluated at the center altitude (DMDHC). Slant air mass is in atmospheres. DMDHDC is in atmospheres per km.

3. The rate of change of the natural logarithm of the intensity, d (ln(I))/dh, (DLIDH) is evaluated from the observed intensity (or ratio to S0) corresponding to ALTT and ALTB, the top and bottom of the three layers under consideration.

4. Estimates of the slant ozone overburden (UT, UC, UB) are made for each of the three altitudes. Initial estimates are taken from the from the model ozone profile contained in the array STD. Ozone values inferred from the rocket flight are used in the estimates for succeeding levels. Ozone overburden is in atm-cm.

5. Values at each altitude for the effective ozone absorption coefficient (ALFAT, ALFAC, ALFAB) and the effective Rayleigh scattering coefficient (BETAT, BETAC, BETAB) are obtained from subroutine ALFEFF.

6. The slant ozone content between ALTT and ALTB in atm-cm (DELU) is computed using equation (5) and saved as (PDELU).

7. DELU is used to recompute the slant ozone for the bottom layer (UB), ALFAB and BETAB are recomputed, ALFAC is taken as the average of ALFAT and ALFAB, and BETAC is the average of BETAT and BETAB.

8. Steps 6 and 7 are repeated until DELU is within 0.1% of PDELU, usually requiring but one iteration.

9. Ozone density at ALTC is then 0.5 * DELU /(secant of the solar zenith angle), in atm-cm/km.

10. The ozone density and a number of related values are saved in the type 1xx. and 2xx. Profile data records.

11. Steps 1-10 are repeated at the next lower altitude level until the range for a particular filter is completed.

12. Steps 1-11 are repeated for the next filter until all seven possibilities have been considered.

Profiles from Each Filter

As the ozone density is obtained at each altitude level from each filter (or from its ratio to the SO data) two data records are created and are included on the Profile Tape. (See the type 1xx. and 2xx. data records described in the chapter on Tape Formats.) The first record contains relevant parameters taken from the Smooth Tape and various elements calculated in the course of obtaining the ozone density. The second record is devoted to atmospheric parameters, that is, ozone values, air pressure and temperature, and associated errors. Selected values from these records are printed as tables.

Composite Rocoz Profile

The Rocoz photometer contains five filters, referred to as S0, S1, S2, S3, and Compensation, with S3 having the shortest center wavelength, S2, S1, and S0 at longer wavelengths, and the Compensation filter at an even longer wavelength for which the ozone absorption coefficient is very small. The signal from the detector with the Compensation filter is used as the reference in an automatic gain control system to continually change the gain of the amplifier for the detector associated with the S0-S3 filters, compensating for changes in total light input such as those due to changes in the direction of the axis of the photometer with respect to the sun.

Ozone profiles are derived independently from the data from each of the four filters (S0, S1, S2, S3). Each profile covers an altitude region of 10 to 25 km, usually with some overlap in altitude coverage. In Subroutine COMPST these independent profiles are combined to form a single profile attributable to this Rocoz flight. To obtain this composite profile, all available data for a particular altitude level are weighted by the inverse of the associated error and averaged. Ozone densities derived from filter ratios are not included.

For the convenience of the user, the ozone density profile is expressed in both atm-cm/km and number/m^3 and is collated with air temperatures and pressures based on the Datasonde and the ECC sonde. In Subroutine CHECKS, the column content (atm-cm) at each altitude level is computed, based on an initial column content above the top level of the ozone profile taken from the ozone model (Subroutine MODEL), and integrating downward.

In Subroutine CHECKS the Composite data are used in a series of consistency checks before filling the remainder of the array with computed partial pressures and mixing ratios.

PROFILE PROGRAM

Consistency Checks

To aid in estimating the quality of the data from a Rocoz flight and related observations, the data are checked for internal consistency. These checks include (1) comparison of the profiles from the various filters with each other, (2) comparison of the composite profile with a model, (3) comparison of the ozone column content measured by the Dobson spectrophotometer with the sum of the columns observed by the Rocoz photometer and the ECC sonde, (4) comparison of the slope deduced in the Smooth Program over a variable height interval with that deduced in the Profile Program over a 2 km interval, (5) comparison of the variations of the Compensation channel with those expected due to changes in solar zenith angle and overhead air mass, and (6) the drag coefficient as a function of altitude and Reynolds number.

The following discussion gives the basis for each check and the significance of the results.

Overlap Analysis

One way to examine the accuracy and precision of the ozone densities is to compare the profiles obtained from the different filters. In Subroutine COMPST data for the various filters are transferred to a single table; Subroutine CHECKS calls Subroutine OVERLP to systematically compare the data from the various filters and to compare data from a particular filter to data derived from the ratio of that filter to the SO filter. For each of the 21 possible combinations, the two altitude profiles are compared by fitting the pairs of points to a straight line (Subroutine LINFIT), and computing its slope (B) and zero intercept (A), i.e.,

$$O3(\text{filter } y) = A + B\ O3(\text{filter } x).$$

One would look for a zero intercept that is small compared to the ozone value at the maximum altitude of the set of points, for a slope that is near 1.0, and for a correlation coefficient (R) that is near 1.0. An examination of the table may reveal whether one of the filters has substantially changed its spectral transmission since its calibration. Values of B that are markedly different from 1.0, but similar from flight to flight may indicate that one or more of the spectral data sets (solar flux, absorption coefficients, etc.) is not correct. One would expect that the values for A, B, and R for a filter paired with its ratio (e.g. S3 compared to S3/SO) would be very close to ideal.

PROFILE PROGRAM

Comparison with Model

The ozone density and overburden (vertical column) as a function of altitude from the Rocoz Composite profile are compared with the values provided by Subroutine MODEL. Currently the model is for mid-latitudes and is from the U.S. Standard Atmosphere, 1976. It would desirable to upgrade Subroutine MODEL to provide a profile that is typical of stated latitude and season, such as might be might be obtained from the analysis of global ozone data sets. Subroutine CHECKS computes the differences and prepares a table of the results.

One would expect most data from Wallops Island to be relatively close to the mid-latitude model, within the variability stated in the tables given in the U.S. Standard Atmosphere, 1976.

Total Ozone

The total ozone (vertical column content) is observed by the Dobson Spectrophotometer and may also be deduced from a combination of the ECC and Rocoz Composite profile. The ECC values are generally considered to be relatively accurate below the ozone density maximum. The Rocoz profiles are better at the higher altitudes.

From a preliminary examination of the data, a "tie-on" altitude is chosen, usually between 18 and 25 km; the column content from the ground to the "tie-on" altitude is obtained from the ECC data report and entered into the Profile Program (Subroutine CARDS). In Subroutine CHECKS, the column content above the "tie-on" altitude is obtained from the Rocoz Composite ozone profile. Errors are assumed to be 7% for the Dobson total ozone; 10% for the ECC segment, and as derived in the Profile Program for the Rocoz segment. The two segments are added, the associated errors derived, and the difference from the Dobson total is noted.

The two observations of total ozone should agree within their estimated errors. If the difference is larger, it may indicate temporal and spatial variability of ozone (particularly if maps from TOMS, the total ozone mapping spectrometer on Nimbus-7, indicate a substantial gradient in that area). A large difference may also indicate that one or more of the three systems involved did not perform as expected and has as yet unidentified errors. This check is sensitive only at altitudes where the ozone density is large, that is, in the lower stratosphere.

Estimations of Slope

In the Smooth Program, all points in the vicinity of each integer altitude are considered, and a value of the intensity (I, number of counts) representative of that level is derived. The number of points considered range between 100 and 800; the altitude interval ranges between 1 and 9 km. In the process, a line of the form, $\ln(I) = A + B(h-hb)$, is used, and the intercept (A) at the base altitude (hb) and the slope (B) are calculated; A and B are then used to obtain the intensity at the altitude level under consideration.

In Subroutine OZDENS of the Profile Program, $d \ln(I)/dh$ is obtained by taking differences over a 2-km interval. For ideal data, the two values should be the same, at least within the error associated with each. Larger differences are probably related to the differing altitude resolution, but should be examined individually.

Variation of the Compensation Channel

A fraction of the light entering the Rocoz instrument is diverted through a Compensation filter to a separate detector. This is a relatively broad-band filter centered at about 375 nm, where the ozone absorption coefficient is several orders of magnitude less than that for the SO filter. Variation of the signal from the detector is due primarily to changes in the angle of the sun with respect to the optical axis of the photometer, but is also affected by the amount of light scattered out of the optical path by molecules and aerosols. In the Smooth Program, the value of the Compensation signal is averaged over 99 filter rotations. In Subroutine CHECKS of the Profile Program, the average value (after taking into account changes in solar zenith angle) between 35 and 50 km is determined; the expected value at lower altitudes is computed, again taking into account the changes in solar zenith angle and, in addition, the loss of light expected due to Rayleigh scattering. The fractional loss is estimated by the method developed by R.W.Fraser (NASA/GSFC, quoted (incorrectly) in Thomas, R.W.L., W.A.Pearce, A.H.Holland, and D.U.Wright, Appl. Optics, 21, 2436-2441, 1982). The correct formula is:

$$fc = 0.376 \, (\sec z)^{0.874} \, 10^{-h/16}$$

where
- fc is the fraction of light scattered out of the path,
- z is the solar zenith angle, and
- h is the altitude in km.

Differences between the predicted and the observed values of

the average Compensation signal may be due to scattering by aerosols, changes in temperature of the photometer, or large (more than 60 degrees) solar zenith angles.

Drag Coefficient

The photometer is suspended from a Starute decelerator, deployed after ejection from the rocket body. The drag coefficient of the Starute and photometer can be computed using

$$C = (g - a) / (2 d v^2 A)$$

where
- C is the drag coefficient,
- g is the acceleration due to gravity,
- a is the observed vertical acceleration,
- d is air density,
- v is the observed vertical velocity, and
- A is the effective area of the Starute.

Because drag is a function of Reynolds number, this also is calculated and listed. That is,

$$Re = v D d / m$$

where,
- Re is the Reynolds number,
- D is the characteristic size,
- m is the dynamic viscosity, and
- d and v are as defined above.

The dynamic viscosity is computed by use of the formula given in the U.S. Standard Atmosphere, 1976, (p.19),

$$m = B T^{3/2} / (T + S),$$

where,
- B is a constant, equal to 1.458×10^{-6} kg/(s m $K^{\frac{1}{2}}$),
- T is temperature in kelvin, and
- S is Sutherland's constant, equal to 110.4 K.

The drag coefficient should vary smoothly as a function of Reynolds number. The observed values increase from about 1 near Apogee to about 1.4 near 20 km. This increase is similar to that for a sphere at similar Reynolds numbers. A substantial deviation from the smooth increase with decreasing Reynolds numbers could indicated problems in the altitude versus time data; A decrease in the magnitude of the drag coefficient could be due to a damaged Starute.

PROFILE PROGRAM

Derived Ozone Values

The Rocoz data as analyzed in this set of programs is interpreted in terms of ozone density as a function of geometric altitude. Although expressed at 1 km intervals, the smoothing interval varies from 3 km at low altitudes to about 9 km near the top of the profile. The density profile is integrated from the top down to obtain the column content as a function of altitude.

For the convenience of the user, the ozone content is also expressed in other commonly used units, that is, as partial pressure, as mixing ratio, as layer content, and with altitude expressed in terms of pressure level. The associated error increases because it is necessary to use the observed air temperatures and pressures in the transformation of units, and the errors in such observations must be considered.

Column Content

The slant ozone (ozone in the path between the photometer and the sun) and the ozone overburden (vertical column above the photometer) are computed in Subroutine OZDENS and given to Subroutine ALFEFF for use in the computation of the effective ozone absorption coefficient. The initial value (at the highest altitude for which there is useful photometer data, that is, 1 km above the top altitude of the Rocoz ozone profile) is obtained from the model profile provided by Subroutine MODEL. Values of slant ozone at lower levels are obtained by adding the observed layer content. The vertical column for each level is obtained by dividing by the secant/Chapman-function of the solar zenith angle at that level, as provided by Subroutine SECANG. These values are computed independently for each filter, i.e., the initial slant ozone used in deriving an ozone profile from the S2 filter is taken from the model profile, not from the profile obtained by use of the S3 filter. The values used in the computations are included in the type 1xx. and 2xx. data records created by the Profile Program.

After ozone profiles are obtained corresponding to each of the filters of the photometer, a Composite Rocoz ozone profile is generated by Subroutines COMPST and CHECKS, as described in an earlier section of this document, and included in the type 300. data records. The initial value of the ozone overburden here is that from the ozone model, multiplied by the ratio of the ozone density in the Composite profile to that in the model profile. The density for each lower level is obtained by assuming the density in

the 1 km layer is the average of the density at its top and base, and adding the layer content to the overburden already available for the top of the layer. These overburdens are the ones used by Subroutine CHECKS for comparison with the model overburdens and the Dobson total ozone observations.

Partial Pressure and Mixing Ratios

The ozone algorithm as implemented in Subroutine OZDENS expresses the ozone density at a given altitude level in terms of atm-cm/km. The following formulae are used in Subroutines OZDENS, CHECKS, and RELATD to express the ozone density in other units:

$$O(\#) = O(ack)\ 1 \times 10^{-5}\ A\ /\ V$$
$$O(nb) = O(ack)\ 0.1\ R^*\ T\ /V,$$
$$O(vmr) = O(nb)\ /\ P,$$
$$O(mmr) = 1.65714\ O(vmr),$$

where

O(#)	is ozone density in number/m^3,
O(ack)	is ozone density in atm-cm/km,
O(nb)	is ozone density in nanobars,
O(vmr)	is ozone volume mixing ratio, parts per million,
O(mmr)	is ozone mass mixing ratio, parts per million,
P	is air pressure, millibars,
A	is Avogadro's number, 6.022169×10^{26} molecules/kmol,
R*	is universal gas constant, 8314.32 N m /(K kmol),
T	is air temperature, kelvin, and
V	is volume of ideal gas at STP, 22.4136 m^3/kmol.

Content of Standard Pressure Layers

To facilitate the comparison of the Rocoz/ECC profiles with those from other sources, Subroutine RELATD prepares a table of layer contents, based on the Composite Rocoz profile and, at the lower altitudes, on the concurrent ECC sonde. Layer boundaries are expressed in milliatmospheres beginning at 1000 matm with the upper boundary at one-half the pressure of the lower boundary. The topmost layer is from 0.24 - 0 milliatm. The layer's ozone content (in milliatmosphere-cm) is the difference of the ozone overburdens at the layer boundaries, as interpolated from the data in the Rocoz Composite ozone table. The ozone content for layers for which the Rocoz profile is not complete is set to 0.

At altitudes in the troposphere and lower stratosphere, layer content is derived from the ECC sonde that was launched near the time of the Rocoz launch, using the column contents given in the ECC tabular listings.

Ozone Values at Standard Pressure Levels

At 33 standard pressure levels ranging from 1000 mbar to 0.05 mbar, Subroutine RELATD displays ozone number densities interpolated from the Rocoz Composite profile and the ECC sonde, air temperatures from the Datasonde and the ECC sonde, geometric altitude at each pressure level, and the ozone mass mixing ratio. Where the various data sets overlap, two sets of temperature, ozone density, and mass mixing ratio are included. The standard pressure levels are at decimal multiples of 10, 15, 20, 30, 40, 50, and 70, and also include 250 and 850 mbar.

PROFILE PROGRAM

Estimation of Errors

There are many sources of uncertainty which affect the ozone profiles obtained through use of observations from the Rocoz photometer, and the associated Datasonde, ECC sonde, and Dobson spectrophotometer. Besides errors related to the Rocoz photometer, there are temperature sensor errors, altitude (radar) errors, pressure (microbaroswitch or hypsometer) errors, and uncertainties due to atmospheric variability (air temperature, air pressure, and Rocoz photometer observations are not from the same vehicle), variability in aerosol content, and solar variability.

The error in the ozone density derived from the Rocoz photometer depends on the accuracy of the various tables used in the computation of the effective ozone absorption coefficient: the ozone absorption coefficient and its temperature dependence, the solar flux, the Rayleigh scattering coefficient, and the measured filter transmission, diffuser transmission, and detector responsivity. The error in the ozone densities also depend on the effectiveness of the compensation scheme, detector noise, noise introduced by the in-flight digitization, noise introduced by the telemetry and recording systems, the accuracy of the radar tracks, and approximations and assumptions made in the course of the data reduction.

The Profile Program attempts to evaluate many of these errors. However, it does not characterize errors in the computation of the effective ozone absorption coefficient, except as can be done by comparing the ozone densities from the different filters. Most errors are expressed as percent and all represent the one-sigma value.

Irradiance as a Function of Time

In this scheme of data analysis, the observed irradiance is always expressed in arbitrary units; no attempt is made to convert the arbitrary units to absolute fluxes. Ozone content is obtained by using the ratio of the radiance observed at the top of a chosen layer to that observed at the base of that layer and hence is independent of the absolute values of the radiances. The unit of irradiance is the number of counts (0 - 1000) at the input of the Rocoz telemetry transmitter and represents the solar flux received on a horizontal plane located at the altitude of the photometer.

The errors in irradiance are handled in three different ways, depending on the time scale. The first group of errors have periods of well under one second, the second group have periods on the order of 1 to 100 seconds, and the last group are drifts over the 20 minutes of the flight.

The first group of errors relate to the determination of the value of a single observation. The output of the photodiode is sampled at precisely the time at which the filter is fully in the optical path and is held electronically for one rotation of the filter wheel. During approximately 600 ms required for one rotation, the signal on hold is sampled about 55 times. The design of the electronics restricts the decay of the signal to less than one count; the analog-to-digital conversion is designed to have an accuracy of $\pm$ 1 count. The extent of the decay and the short-term random component of the a/d conversion can be checked by a visual inspection of the listing of the telemetry data. Noise in the photometer electronics may correspond to several counts and noise introduced during the telemetry transmission and recording may be as much as full scale. In Subroutine AVG of the Edit Program, it is required that at least half of the samples be within 6 counts of each other, the remainder are discarded, and an average is taken of the selected values. Otherwise a dummy value (-99.) is used to indicate that no value is available for this filter for this rotation. No estimate is made of the error attributable to these sources alone.

The next group of errors are of somewhat lower frequency and are due primarily to low frequency components in the noise inherent in the photodiode and its current amplifier, to noise in the compensation circuitry, and possibly due to less than perfect optics such that azimuth dependent components may be present in the observed irradiance. In the Smooth Program, a value of the irradiance at each integer altitude is obtained from consideration of a number of observations in the vicinity of that altitude. The minimum number of points assembled by Subroutine SELECT is 100; the minimum altitude range is 1 km; at high altitudes the 100 points correspond to an altitude interval of about 8 km; at low altitudes several hundred points may be needed to cover one km altitude. In Subroutine LOGFIT, a straight line of the form, $\ln I = A + B (H - Hb)$, is fitted to this array of points and values of A and B (with standard deviations) are obtained. Here, I is the irradiance in terms of counts, H is the altitude of the point under consideration, and Hb is the lowest altitude in the interval under consideration. The irradiance at the integer altitude level is then computed using the computed values of A and B. This value of irradiance, A, B, the altitude bounds, and the

standard deviations associated with A and B (sigmaa and sigmab) are written on the Smooth Tape for input to the Profile Program. In Subroutine OZDENS of the Profile Program, the standard deviation of ln I, sdlni, is computed using the formula, $sdlni = (sigmaa^2 + (sigmab(H-Hb))^2)^{1/2}$. The error associated with the difference of ln I at the top and the base of the 2-km layer under consideration is then the rms sum of the errors associated with each ln I.

The third group of errors are slow drifts that may be appreciable during the 15 to 30 minutes required for the Rocoz photometer to drop from its ejection altitude to near the tropopause (or over the horizon such that telemetry signals are no longer received). This includes changes in photodiode responsivity due to changes in temperature or length of time in operation, drifts in the zero level of the electronics, or slow changes in the absolute calibration of the a/d converter. One way of detecting some of these changes is to compare the ozone derived from the signal from a particular filter to the ozone derived from the ratio of that filter signal (counts) to the signal from the S0 filter, which is at a wavelength for which the ozone absorption coefficient is relatively small. In Subroutine OVERLP of the Profile Program, a comparison is made between the two profiles.

Altitude

The error associated with the radar data from the Wallops Flight Facility is stated to be 60±30 feet. In Subroutine OZDENS of the Profile Program, the error in altitude is set to 20 m; this error, expressed in percent, is placed in the type 2xx. data record. The error in the vertical thickness of the layer under consideration is set to 14 m.

Air Temperature

Air temperature is obtained from the Datasonde at altitudes above about 20 km and from the ECC sonde at the lower altitudes. The error in the Datasonde temperatures is typically one degree but increases rapidly above 55 km, reaching 15 degrees at 70 km. To this must be added the uncertainty due to atmospheric variability. The formulae used for this is given in the earlier section on Datasonde Observations. The result, expressed in percent, is placed in the type 2xx. data record.

PROFILE PROGRAM

At altitudes below about 20 km, air temperature is obtained from the meteorological sonde to which the ECC sensor is attached. The one-sigma error is assumed to be one kelvin.

Air Pressure

Air pressure is obtained from the meteorological sonde to which the ECC sensor is attached and is assumed to have an error of 0.7 mbar. At altitudes above about 20 km, pressures are derived from a "base pressure" and the datasonde temperature profile, as described in the earlier section on Datasonde observations. The error in the base pressure is that of the ECC sonde pressure plus errors due to atmospheric variability and in matching altitude levels; the error in base pressure is assumed to be 1 mbar. At higher altitudes the effect of temperature errors must be added to this. These estimates are made in Subroutine OZDENS, expressed as percent, and placed in the type 2xx. data records.

Ozone Density

In Subroutine OZDENS the error in the ozone density is set to the rms sum of the error in d(ln I) and the error in layer thickness, all expressed in percent and the value placed in the type 2xx. data record.

In Subroutine COMPST, the profiles from the individual filters are combined to provide a composite profile. At each altitude level the available values from the four filters are weighted inversely by the associated error. That is,

$$\text{Composite error} = \text{sum}(1./\text{err}(i)) \quad \text{and}$$

$$\text{Composite density} = \frac{\text{sum}\ (\text{density}(i)/\text{err}(i))}{\text{sum}(\text{err}(i))}$$

where i refers to the values available at each level. The resulting composite density and error are placed in the type 300. data records.

Ozone Overburden

For the Composite data set, in Subroutine COMPST, the initial overburden is obtained by adjusting the column content given in the Ozone Model to the density at that level in the Composite profile. That is, at the top level,

$$\text{Col(comp)} = \text{Col(model)} * \text{Density (comp)} / \text{Density (model)}$$

The error associated with this is the rms sum of the Composite density error and the estimated error in the scale

height of the model; this latter error is assumed to be 15%. The column content at the next lower level is obtained by adding the average density in that layer to the column at the top of the layer. The error at this level then is the rms sum of the error (in atm-cm) of the column at the top of the layer and the errors in the densities in the top half and bottom half of the layer. The column error is then converted to percent and stored in the type 300. data record.

Ozone Partial Pressure and Mixing Ratio

In Subroutine CHECKS the Composite data set is completed by computing the ozone partial pressure and volume mixing ratio. The error associated with the partial pressure is the rms sum of the percent errors in the ozone density and the air temperature. The error associated with the volume mixing ratio is the rms sum of the percent errors associated with the ozone partial pressure and the air pressure. The Composite data set is then transferred to the type 300. data records.

Common Areas

The Profile Program uses seven named common areas to facilitate sharing of data among the various subroutines. The contents of each common area are described in this section. All variables are real (R*4) or integer (I*4) according to the usual naming convention, except where specifically indicated otherwise. The seven named common areas are SETUP, PROFLS, FSHAPE, CONSTT, DATAIN, COEFTS, and DATOUT.

```
COMMON/SETUP/TAPEIN,TAPOUT,NFIN,NFOT,INCLD(7),TOP(7),
             BASE(7)

   TAPEIN  R*8   Input Tape Volume Identifier
   TAPOUT  R*8   Output Tape Volume Identifier
   NFIN          File Number on input tape
   NFOT          File Number on output tape
   INCLD   (1)      03  process S3 filter
           (2)      02  process S2 filter
           (3)      01  process S1 filter
           (4)      00  process S0 filter
           (5)      30  process S3/S0 data
           (6)      20  process S2/S0 data
           (7)      10  process S1/S0 data
                    any negative number - ignore this filter
   TOP           highest altitude to be processed, km
   BASE          lowest altitude to be processed, km
```

PROFILE PROGRAM

```
COMMON/PROFLS/DSB(3),MXSND,NECC(2),ECCLM(3,2),SONDE(5,70)
              ECC(4,19,2),STD(3,60)

   DSB      (1)    base altitude, km, for use with Datasonde
            (2)    temperature (kelvin) at base altitude
            (3)    air pressure (mbar) at base altitude
   MXSND           index of lowest altitude in SONDE
   NECC            number of rows in ECC for each of 2 sondes
   ECCLM    (1,x)  ozone column (atm-cm) up to 250 mbar
            (2,x)  ozone column (atm-cm) up to 125 mbar
            (3,x)  ozone column (atm-cm) up to 62.5 mbar
   SONDE           for each altitude, starting at highest alt
            (1,x)  altitude, km, for Datasonde
            (2,x)  air temperature, kelvin
            (3,x)  air pressure, mbar, hypsometric value
            (4,x)  air density, derived from T and P, kg/m^3
            (5,x)  error, one sigma, in air temperature, k
   ECC             data at standard pressure levels from ECCs
                   beginning at 1000 mbar
            (1,x,y)  altitude, km
            (2,x,y)  air temperature, kelvin
            (3,x,y)  air pressure, mbar
            (4,x,y)  ozone partial pressure, nanobar
   STD             values from model ozone profile
            (1,x)  altitude, km, starting at 70 km
            (2,x)  ozone number density, molecules/m^3
            (3,x)  ozone overburden, atm-cm


COMMON/FSHAPE/CW(7),BW(7),CMCBRD(4,7)

   CW              center wavelength, nm, for each filter
   BW              bandwidth at half-height, each filter
   CMCBRD   (1,x)  A0 as given by NWC, McBride calibration
            (2,x)  A1        "
            (3,x)  A2        "
            (4,x)  Beta      "
```

COMMON/CONSTT/AVOGAD,VOLSTP,RSTAR,DGTORD,GRV45,AIRM,GRV,
RZRO

AVOGAD	6.022169^{26} molecules, Avogadro's number per mole
VOLSTP	22.4136 liters per mole
RSTAR	8314.32 N m/(kmol K), universal gas const.
DGTORD	1.745329^{-2} radians per degree
GRV45	9.806160 m/s² acceleration of gravity at 45 degrees latitude
AIRM	28.964 kg/kmol, molecular weight for air
GRV	m/s² accceleration of gravity at latitude of launch site
RZRO	km, radius of earth at latitude of launch

COMMON/DATAIN/NLAYRS,SECSZA(60),SMOOTH(20,60,7)

NLAYRS	number of altitude layers used in SMOOTH
SECSZA	secant/Chapman-function of solar zenith angle for each layer
SMOOTH	all of the data records from the Smooth tape, separated by filter Note that in Subroutine OZDENS, the Smooth records are replaced by the Profile data records for each filter

COMMON/COEFTS/GAMM(1000),BETA(1000),ABSZ(1000),ABST(800,2)

GAMM	product of solar flux, diffuser transmission, and detector responsivity from 2401 to 3400 angstroms
BETA	Rayleigh scattering coefficient, 2401-3400
ABSZ	ozone absorption coefficient, 2401-3400 A at room temperature
ABST	ozone absorption coefficient, 2601-3400 A at two lower temperatures

PROFILE PROGRAM

```
COMMON/DATOUT/NSAV,PED(20,30),SAVE(20,60)
```

NSAV	The number of records in PED or SAVE to be written to the Profile output tape
PED	All the Pedigree records read from the Smooth tape or created in Profile
SAVE	Data records created by Profile Program

In Subroutine COMPST, this area is reassigned thus:

```
COMMON/DATOUT/NSAV,NDXTOP,NDXBAS,NLVLS,DM(17),WORK(20,89)
```

In Subroutines RELATD and PRTWRT, this common area is described as follows:

```
COMMON/DATOUT/NSAV,NDXTOP,NDXBAS,NLVLS,DM(10),DOBTM,DOBAM,
              DOBPM,PMDL(2),ECTIE,ECCOL,WORK(20,89)
```

NSAV	
NDXTOP	index in WORK or COMP (see below) for top of Rocoz ozone profile.
NDXBAS	index for lowest altitude of Rocoz profile
NLEVLS	
DM(1)	Rocoz launch date, MMDDYY.
DM(2)	Rocoz launch time, HHMMSS.S
DM(3)	launch latitude, ±degrees
DM(4)	launch longitude, degrees EAST
DM(5)	Rocoz flight number xxx.x
DM(6)	
DM(7-10)	launch site, EBCDIC characters
DM(11) DOBTM	date of Dobson observations, MMDDYY.
DM(12) DOBAM	Dobson data, morning, atm-cm
DM(13) DOBPM	Dobson data, evening, atm-cm
DM(14,15)PMDL	Model identification, EBCDIC characters
DM(16) ECTIE	tie-on altitude for ECC data, km
DM(17) ECCOL	ECC ozone column up to ECTIE, atm-cm
WORK	work space used in preparation of Composite ozone profile

In Subroutines RELATD and PRTWRT, WORK is further divided thus

```
COMMON/DATOUT/NSAV......,COMP(20,70),TYP4(20,2),TYP5(10,34)
```

COMP	Rocoz composite ozone profile (type 300. data record)
TYP4	ozone content in std pressure layers (type 400. data record)
TYP5	ozone values at standard pressure levels (type 500. data record)

PROFILE PROGRAM

Input Data

The Profile Program uses the Smooth Tape as the source of data from the Rocoz photometer; the detailed description of this tape is given in the section on Tape Formats. DATA5 "cards" are the source of specific run options, calibration information, and observations from the Dobson spectrophotometer, the Datasonde, and ECC sondes. Data needed to compute effective absorption and scattering coefficients are stored on disc: solar flux, rayleigh scattering coefficients, ozone absorption coefficients at three temperatures, diffuser transmission, detector responsivity, and, for filters calibrated at the Wallops Flight Facility, filter shapes.

Card Input

For ease in identification, each card has a letter in the first column; this is not read by the Program. Approximately 100 cards are needed, depending upon the altitude range of the Datasonde and the number of ECC sondes.

Columns	Format	Content	Variable
1		A One card required. Tape and Filter IDs	
2-7	F6.1	Flight number and segment	FLT(1)
10-17	A8	DT, Tape Volume Identifier, volume serial number for input (Smooth) tape	TAPEIN
18-20	I3	file number on input tape	NFIN
25-32	A8	DT, Tape Volume Identifier, output (Profile) tape	TAPOUT
33-35	I3	file number on output tape	NFOT
40-41	I2	month, filter calibration	MDY(1)
43-44	I2	day, filter calibration	MDY(2)
46-47	I2	day of month, filter calibration	MDY(3)
49-52	A4	filter manufacturer	MFG
54-58	I5	dddyy, date of filter set assembly	ICAL
60-65	I6	filter set identification no.	ICLID

Card Input (continued)

Columns	Format	Content	Variable
1		B Seven required. Filter processing	
3-4	I2	03, 02, 01, 00, 30, 20, or 10; use negative number (-1) to skip	INCLD(x)
5-9	F5.1	highest altitude to be used	TOP(x)
10-14	F5.1	lowest altitude to be used	BASE(x)
17-22	F6.2	center wavelength, nm	CW(x)
24-28	F5.2	bandwidth, nm	BW(x)
31-38	F8.4	McBride's A0	CMCBRD(1,x)
40-49	F10.5	McBride's A1	CMCBRD(2,x)
51-60	F10.5	McBride's A2	CMCBRD(3,x)
62-68	F7.5	McBride's B	CMCBRD(4,x)

Notes:
- Values in INCLD must be in the order indicated.
- For cards 5, 6, and 7, CW and BW are blanks.
- The subscript, x, refers to card number (1-7)
- The values of center wavelength, bandwidth, A0, A1, and A2 are also calculated for the filters calibrated at WFF; B is obtained for the center wavelength from the Rayleigh scattering table.

Columns	Format	Content	Variable
1		C One required. Dobson data	
3-4	I2	month, date of Dobson obs.	MDY(1)
6-7	I2	day of month, date of Dobson obs.	MDY(2)
9-10	I2.1	year , date of Dobson observations	MDY(3)
13-17	F5.1	AM value, in Dobson units	PED(3,6)
24-24	F5.1	PM value, in Dobson units	PED(4,6)

Card Input (continued)

Columns	Format	Content	Variable
1		D One required. Datasonde ID	
3-10	A8	Datasonde flight number.	FLTID
13-14	I2	month, date of datasonde flight	MDY(1)
16-17	I2	day of month, date of datasonde	MDY(2)
19-20	I2	year, date of datasonde	MDY(3)
23-24	I2	hour, time of datasonde launch	IH
25-26	I2	minute, time of datasonde launch	IM
29-31	I3	minutes between datasonde and Rocoz launches	MDEL
34-40	F7.1	base altitude, meters	DSB(1)
43-48	F6.2	base temperature, C. or kelvin	DSB(2)
51-56	F6.2	base pressure, mbar	DSB(3)

Note: Base altitude, temperature, and pressure are obtained from the study of data from the nearly simultaneous ECC sondes and are used to calculate the pressures and densities at Datasonde altitudes.

Columns	Format	Content	Variable
1		E Max of 70 required. Datasonde Data	
3-8	F6.0	altitude of observation, m or km	ALT
11-16	F6.2	observed temperature, C. or kelvin	TEMP
19-22	F4.1	error in temperature, 2-sigma, deg	TERR

Notes:
- First card gives data for the highest altitude.
- Last card must set "altitude" to -1, to indicate end of data.
- If the Datasonde report does not include error estimate, use errors from F.Schmidlin (JGR,86, 9599,1981)

PROFILE PROGRAM

Card Input (continued)

Columns	Format	Content	Variable
1		F One required. ECC sonde ID	
3-10	A8	ECC sonde flight number.	FLTID
13-14	I2	month, date of ECC sonde flight	MDY(1)
16-17	I2	day of month, date of ECC sonde	MDY(2)
19-20	I2	year, date of ECC sonde	MDY(3)
23-24	I2	hour, time of ECC sonde launch	IH
25-26	I2	minute, time of ECC sonde launch	IM
29-34	F6.0	tie-on altitude, meters	TIEALT
37-43	F7.5	ozone column up to TIEALT, atm-cm	TIECOL

Note: If data from a second ECC sonde is available, a type F card for the second sonde follows the type G (data) cards for the first sonde.

Columns	Format	Content	Variable
1		G 19 required. ECC sonde Data	
3-7	I5	altitude, meters	KH
10-14	F5.1	ozone pressure, nanobars	ECC(4,I,1)
17-22	F6.1	air pressure, millibars	ECC(3,I,1)
25-29	F5.1	air temperature, C. or kelvin	ECC(2,I,1)

Note: Data are given at 19 standard pressure levels, namely, 1000., 850., 700., 500., 400., 300., 250., 200., 150., 100., 70., 60., 50., 40., 30., 25., 20., 15., and 10. If data are not available for a given pressure level, the altitude, ozone pressure, and temperature are to be set to 0.0 The first card is for 1000. mbar.

If data from a second ECC sonde are available, they follow the type F card identifying the flight.

Columns	Format	Content	Variable
1		H One required. ECC Ozone Column	
7-13	F7.5	ECC 03 column, up to 250 mbar	ECCLM(1)
20-26	F7.5	ECC 03 column, up to 125 mbar	ECCLM(2)
33-39	F7.5	ECC 03 column, up to 62.5 mbar	ECCLM(3)

Note: Column content is in atm-cm of ozone.

TAPE FORMATS

TAPE FORMATS

RADAR TAPE FORMAT

Most tapes for flights through April 1982 (Rocoz flight no. 315) were prepared by the Wallops Station Meteorological Support program 1.1.2123. The "GE-625 Meteorological Support Format" (MESUP) is as follows:

Each physical record is composed of twenty-one twelve-character words. The word layout is in the following form:

X	X	X	X	X	X	X	X	X	X	S	0
0	1	2	3	4	5	6	7	8	9	10	11

Character number 0 is the most significant character and character number 11 is the least significant character and will always be a zero. The sign position is fixed for all words and is in character position 10. The first word of each record is a system word recorded for tape identification and may be ignored in all processing.

The tape is recorded with word one character number 0 being recorded first. Each tape file will be followed by a tape mark. Inter-record gap is approximately three-fourths of an inch. Each tape will have a ten to twenty foot leader of blank tape before the beginning of tape (BOT) tinsel marker.

Tape Description and Parameters for JCL

7-track	UNIT=2400-7 or 7TRACK
no label	LABEL=NL
records are fixed length	RECFM=F
block size is 252 bytes	BLKSIZE=252
record length is 252 bytes	LRECL=252
density = 800 bpi	DEN=2
even parity	TRTCH=E
BCD characters	TRTCH=T (to EBCDIC)

Radar Tape Format

Word Number	Character Positions	Data Content	Decimal point assumed between characters
2	0-9	Elapsed time given in seconds.	5&6
3	0-9	Slant range from the origin in feet.	9&10
4	0-9	Azimuth from origin given in degrees.	5&6
5	0-9	Elevation from origin given in degrees.	5&6
6	0-9	Horizontal range from origin in feet.	9&10
7	0-9	North-South range from origin in feet.	9&10
8	0-9	East-West range from origin in feet	9&10
9		(Not used, contains zeros)	
10	0-9	Altitude above an oblate spheroid in feet.	9&10
11		(winds or zeros)	
12		(winds or zeros)	
13	0-9	Horizontal component of earth relative velocity vector in feet/second.*	9&10
14	0-9	East-West component of negative velocity vector in feet/second.*	9&10
15	0-9	North-South component of negative velocity vector in feet/second.*	9&10
16	0-9	Altitude component of velocity vector in feet/second.*	9&10
17		(Not used, contains zeros)	
18	0-9	Azimuth of the horizontal component of the negative velocity vector in degrees.*	5&6
19		(Not used, contains zeros)	
20		(Not used, contains zeros)	
21		(not used, contains zeros)	

* Velocity vector is defined as positive in the direction of target motion measured clockwise from North.

TAPE FORMATS

RADAR (1983) TAPE

Radar data for flights in 1983 and later are prepared on the Applications Directorate Eclipse computer at WFF and provide location in meters, latitude and longitude on a 9-track tape. This PASS1 tape may be listed by the Listrad Program. The Merge Program has been modified such that it can accept either this tape or the Reformatted Radar Tape produced by the Radar Program. When this, the Radar (1983) tape, is used, the Merge Program prepares the Radar Pedigree (Type -100.) record.

Tape Description and Parameters for JCL

9-track	UNIT=800
no label	LABEL=NL
records are fixed length and blocked	RECFM=FB
blocksize is 32 bytes	BLKSIZE=32
record length is 32 bytes	LRECL=32
density = 800 bpi	DEN=2

Radar (1983) Tape Format

All words are binary double precision, REAL*8.

Word Number	Data Content
1	Seconds since launch time
2	Altitude, meters
3	Latitude, degrees North
4	Longitude, degrees East

TAPE FORMATS

REFORMATTED RADAR TAPE

The Reformatted Radar Tape is a product of the Radar program. Like all tapes produced by this Rocoz set of programs, the first record is a "Pedigree" record giving the flight number, date of creation of this tape, and other Rocoz-related data entered via the DATA5 input unit. The program converts times to seconds after the hour instead of after launch and converts English units to metric units. Each file contains all available data for a single flight.

Tape Description and Parameters for JCL

9 track	UNIT=2400-9 or 9TRACK
standard label	LABEL=SL
records are fixed length and blocked	RECFM=FB
blocksize is 5200 bytes	BLKSIZE=5200
record length is 52 bytes	LRECL=52
tape density is 1600 bpi	DEN=3

Pedigree Record

Words 1-9 are R*4 real words; 10-13 are EBCDIC characters.

Word	Content	Source
1	-100.	Assigned
2	Flight Number	DATA5
3	VXX. where V indicates vehicle type: =1 rocket =2 balloon and XX indicates launch site: =01 Wallops Island, Virginia =02 Poker Flats, Alaska =03 Natal, Brazil =04 Marambio, Antarctica =05 Palestine, Texas	DATA5
4	MMDDYY. month, day, year of launch	DATA5
5	HHMMSS.S hour, minute, second of launch	DATA5
6	±XX.XXX latitude of launch site	DATA5
7	XXX.XXX longitude of launch, degrees WEST	DATA5
8	MMDDYY. date radar tape was received	DATA5
9	MMDDYY. date of creation of this tape	Computer
10-13	launch site, 16 EBCDIC characters	DATA5

TAPE FORMATS

Data Records (Reformatted Radar Tape)

All words are R*4 real words

Word	Content	Unit
1	time from hour prior to start of data	seconds
2	slant range	meters
3	azimuth from origin	degrees
4	elevation from origin	degrees
5	horizontal range from origin	meters
6	north-south range from origin	meters
7	east-west range from origin	meters
8	altitude above oblate spheroid	meters
9	horizontal component of velocity relative to the earth	meters/second
10	east-west component of velocity	meters/second
11	north-south component of velocity	meters/second
12	vertical velocity	meters/second
13	azimuth of horizontal component of velocity	degrees

The velocity vector is defined as positive in the direction of target motion measured clockwise from North.

TELEMETRY TAPE FORMAT

The telemetry tapes for the Rocoz flights have been produced by the "Digital Telemetry System (PDP 11/60): DITES" at the Wallops Flight Facility. NOTE THAT THE BYTES FROM THE PDP-11 MACHINE ARE PACKED MSB LAST.

Tape Description and Parameters for JCL

9-track	UNIT=2400-9 or 9TRACK
no label	LABEL=NL
record length is undefined	RECFM=U
block size is 2440 bytes	BLKSIZE=2440
density is 800 bpi	DEN=2

The "televent-11" data tapes from this WFF system consist of three different types of records. The first record of the Rocoz data tape is a Header Record that contains up to 80 ASCII characters. The second type of record is a Data Description Record which describes the data for the Rocoz data stream. The third type of record is the Data Record.

Header Record

Word Number	Content		Description
1	177776		-2 for DEC Fortran compatibility
2		NN	number of words in record
3	000000		0 to identify Header Record
4	B	A	4-character stream identification
5	D	C	(note order or characters)
6		N	tape number
7 through 46	B … Z	A … Y	ASCII text. Each character in a word is recorded most significant bit last.

Data Description Record

Word No.	Content	Typical Value	Description
1	177776	-2	-2 for DEC Fortran compatibility
2	N	20	number of words in record
3	177775	-3	-3 to identify Data Description Record
4	B A	PC	4-character Run Identifier from setup
5	D C	M4	of tape processing
6	B A	PC	4-character Stream Identifier (usually
7	D C	M4	the same as words 4 and 5
8	N	8	number of data words per frame
9	N	110	number of frames per buffer
10	N	0	scaling factor (normally = 0)
11	N	3	number of frame Merge words
12	N	11	number of words/frame
13	N	2	number of preface words above 8
14	N	0	buffer appendix size
15	N	1210	INPUT buffer size (words)
16	N	1220	OUTPUT buffer size (words)
17	N	0	frames/subframe number 1
18	N	0	frames/subframe number 2
19	N	0	recording mode (0=word; 1=byte)
20	020040		two ASCII blanks

Data Record

The data record consists of a 10-word preface, 110 11-word data frames, and no appendix.

Preface

Word No.	Content	Typical Value	Description
1	177776	[illegible]	-2 for DEC Fortran compatibility
2	N	122[illegible]	record length (words)
3	N		block count
4	B A	PC	4-character Stream Identifier
5	D C	M4	
6	A P	10	A is no. of Appendix words ( ); P is no of Preface words ( )
7	L M	1210	INPUT buffer size
8	S F		TFE status and frame information (see below for explanation)
9	N	110	number of frames per buffer
10	N	0	scaling factor (normally = 0)

Word no. 8: TFE status

Bit	Content
0-8	frame number of first search
9	sub-com 2 search on last buffer
10	sub-com 1 search on last buffer
11	frame search on last buffer
12	multiple search on one of below
13	sub-com 2 search flag
14	sub-com 1 search flag
15	frame search flag (most significant bit)

A hex value of 00 is normal; FF usually indicates missing frames.

Data Frame

Word Number	Content
1	S3 filter, counts
2	S2 filter, counts
3	compensation filter, counts
4	S1 filter, counts
5	S0 filter, counts
6	battery voltage, counts
7	marker pulse,counts
8	uncompensated value, counts
9	milliseconds (see below)
10	minutes and seconds (see below)
11	day of year, hour of day (GMT) (see below)

Word 9:

15 14 13 12	11 10 9 8	7 6 5 4	3 2 1 0
tenths of sec.	hundredths of s	thousandths s	

Word 10:

15	14 13 12	11 10 9 8	7 6 5 4	3 2 1 0
	tens of min	units of min	tens of sec	units of sec.

Word 11:

15 14	13 12 11 10	9 8 7 6	5 4	3 2 1 0
100's	tens of day	units of day	tens hr	units of hour

TAPE FORMATS

EDITED OZONE DATA TAPE FORMAT

The Edited Ozone Data Tape is the product of the Edit Program. Following the single Pedigree record are Data records, one record for each rotation of the filter wheel. Battery voltage and temperature data are converted to engineering units; the remaining data are in telemetry counts. All words are R*4 real numbers.

Tape Description and Parameters for JCL

9 track	UNIT=2400-9 or 9TRACK
standard label	LABEL=SL
records are fixed length and blocked	RECFM=FB
blocksize is 8000 bytes	BLKSIZE=8000
record length is 80 bytes	LRECL=80
tape density is 1600 bpi	DEN=3

Edit Pedigree Record

Word	Content	Source
1	-200.	Assigned
2	XXX.S flight number.segment for rocket flights, S is 0	DATA5
3	Payload number	DATA5
4	MMDDYY. month, day, year that telemetry tape was received.	DATA5
5	MMDDYY. month, day, year for creation of this tape.	Computer
6	Battery calibration: volts (upper level)	DATA5
7	" " tm count " "	DATA5
8	" " volts (lower level)	DATA5
9	" " tm count " "	DATA5
10	Temperature calib.: degree C. (lower)	DATA5
11	" " tm count "	DATA5
12	" " degree C. (mid)	DATA5
13	" " tm count "	DATA5
14	" " degree C. (high)	DATA5
15	" " tm count	DATA5
16	0.0	
17	0.0	
18	0.0	
19	0.0	
20	0.0	

Edit Data Record

Word	Content	Unit
1	time since hour of tm word 1 (S0)	seconds
2	time since hour of tm word 2 (S1)	seconds
3	time since hour of tm word 4 (S2)	seconds
4	time since hour of tm word 5 (S3)	seconds
5	value of tm word 1 (S0)	counts
6	value of tm word 2 (S1)	counts
7	value of tm word 4 (S2)	counts
8	value of tm word 5 (S3)	counts
9	value of marker pulse (tm word 7)	counts
10	value of base level (tm word 7)	counts
11	compensation word (tm word 3) for S0	counts
12	compensation word (tm word 3) for S1	counts
13	compensation word (tm word 3) for S2	counts
14	compensation word (tm word 3) for S3	counts
15	length of this cycle	seconds
16	average length of last ten cycles	seconds
17	average value of word 3	counts
18	battery voltage (average over 110 frames)	volts
19	temperature (from marker pulse height)	degrees C.
20	number of frames in this cycle	count

TAPE FORMATS

MERGE TAPE FORMAT

The Merge Tape is the product of the Merge Program. The first record is the Pedigree record from the Reformatted Radar Tape; the second record is the Pedigree record from the Edited Ozone Tape. The third record is the Pedigree record created by the running of the Merge Program. The data records essentially replace the time information with altitude information. All words on this tape are R*4 real numbers.

Tape Description and Parameters for JCL

9 track	UNIT=2400-9 or 9TRACK
standard label	LABEL=SL
records are fixed length and blocked	RECFM=FB
blocksize is 8000 bytes	BLKSIZE=8000
record length is 80 bytes	LRECL=80
tape density is 1600 bpi	DEN=3

Merge Pedigree Record

Word	Content	Source
1	-300.	Assigned
2	XXX.S flight number.segment for rocket flights, S is 0	DATA5
3	MMDDYY. month, day, year for creation of this tape.	Computer
4	Apparent right ascension of the sun, hour	DATA5
5	" " " minutes	DATA5
6	" " " seconds	DATA5
7	" " " , difference between two days, seconds	DATA5
8	Apparent declination of the sun, degrees	DATA5
9	" " , minutes	DATA5
10	" " , seconds	DATA5
11	" " , difference between two days,seconds	DATA5
12	Apparent sidereal time, hour	DATA5
13	" " minutes	DATA5
14	" " seconds	DATA5
15	0.0	
16	0.0	
17	0.0	
18	0.0	
19	0.0	
20	0.0	

Merge Data Record

Word	Content	Unit	Word on Edit Data Rec
1	time since hour of tm word 1 (S0)	seconds	1
2	length of this cycle	seconds	15
3	number of samples in this cycle	count	20
4	temperature of instrument	degrees C.	19
5	value of tm word 1 (S0)	counts	5
6	value of tm word 2 (S1)	counts	6
7	value of tm word 4 (S2)	counts	7
8	value of tm word 5 (S3)	counts	8
9	value of marker pulse (tm word 7)	counts	9
10	battery voltage	volts	18
11	compensation word (tm word 3) for S0	counts	11
12	compensation word (tm word 3) for S1	counts	12
13	compensation word (tm word 3) for S2	counts	13
14	compensation word (tm word 3) for S3	counts	14
15	average value of compensation word	counts	17
16	altitude for tm word 1 (S0)	meters	
17	altitude for tm word 2 (S1)	meters	
18	altitude for tm word 4 (S2)	meters	
19	altitude for tm word 5 (S3)	meters	
20	solar zenith angle	degrees	

TAPE FORMATS

SMOOTH TAPE FORMAT

The Smooth Tape is the product of the Smooth Program. The first record is the Pedigree record from the Reformatted Radar Tape; the second record is the Pedigree record from the Edited Ozone Tape. The third record is the Pedigree record from the Merge Program. The fourth record is the Pedigree record created by the Smooth program. Each Smooth Data record provides data at one integer altitude for one filter. After data records for each of the four filters, similar information is given for S3/S0, S2/S0, and S1/S0. All words are R*4 real numbers.

Tape Description and Parameters for JCL

9 track	UNIT=2400-9 or 9TRACK
standard label	LABEL=SL
records are fixed length and blocked	RECFM=FB
blocksize is 4000 bytes	BLKSIZE=4000
record length is 80 bytes	LRECL=80
tape density is 1600 bpi	DEN=3

Smooth Pedigree Record

Word	Content	Source
1	-400.	Assigned
2	XXX.S flight number.segment for rocket flights, S is 0	DATA5
3	MMDDYY. month, day, year for creation of this tape.	Computer
4	zero offset for S0, counts	DATA5
5	zero offset for S1, counts	DATA5
6	zero offset for S2 at temp. of word 11	DATA5
7	zero offset for S3 at temp. of word 11	DATA5
8	maximum integer altitude to be processed	DATA5
9	minimum integer altitude to be processed	DATA5
10	minimum acceptable value of comp. word	DATA5
11	temperature (deg. C) for words 6 and 7	DATA5
12	temperature (deg. C) for words 13 and 14	DATA5
13	zero offset for S2 at temp. of word 12	DATA5
14	zero offset for S3 at temp. of word 12	DATA5
15	0.0	
16	0.0	
17	0.0	
18	0.0	
19	0.0	
20	0.0	

Smooth Data Record

Word	Content	Unit
1	filter position: 3., 2., 1., or 0. if ratio to S0: 30., 20., or 10.	
2	altitude level, H	kilometers
3	signal at XCEN, I=EXP(A+B*(H-Hb))	count or ratio
4	error = $(\mathrm{SIGMAA}^2 + (\mathrm{H-Hb})^2\ \mathrm{SIGMAB}^2)^{1/2}$	See note.
5	solar zenith angle at XCEN	degrees
6	time at XCEN	seconds after hour
7	temperature of instrument	degrees C
8	average length of filter cycle (99 cycles)	seconds
9	battery voltage	volts
10	average compensation word (99 cycles)	counts
11	upper end of altitude interval	kilometers
12	lower end of altitude interval	kilometers
13	number of points used	count
14	estimated signal at Hb altitude, =EXP(A)	
15	standard deviation of A (SIGMAA)	
16	estimated absorption and scattering,=-B	
17	standard deviation of B (SIGMAB)	
18	standard deviation of fit to curve	
19	correlation coefficient	
20	number of points provided in altitude interval	

Note: In files created before Dec. 1983, word 4 is slope (= B*I).

TAPE FORMATS

PROFILE TAPE FORMAT

The Profile Tape is the product of the Profile Program and is intended to be suitable for the archival of data from the Rocoz flight. It includes not only the derived ozone profile, but also the related ECC and Datasonde data and the calibration constants used in the processing of the Rocoz data. The first group of records are Pedigree records, both those from preceding programs in the Rocoz data reduction system and created by the Profile program. The second group of records give ozone content as a function of altitude with values of various parameters developed in the computation. The third group of records give the ozone content in various units and altitude levels for the convenience of the user. The maximum number of records for a flight is 456. Most of the data are in R*4 real words except for some words in the Pedigree records which are in character (EBCDIC) format.

Tape Description and Parameters for JCL

9 track	UNIT=2400-9 or 9TRACK
standard label	LABEL=SL
records are fixed length and blocked	RECFM=FB
blocksize is 4000 bytes	BLKSIZE=4000
record length is 80 bytes	LRECL=80
tape density is 1600 bpi	DEN=3

Types of Records

First Word	Content	Number of this type
-100.	Pedigree: reformatted radar tape	1
-200.	Pedigree: edited telemetry tape	1
-300.	Pedigree: merge data tape	1
-400.	Pedigree: smooth data tape	1
-500.	filter: McBride coefficients	1
-501.	filter coeff; Dobson data	1
-502.	Datasonde flight ID and data	1
-503.	Datasonde data	3
-504.	ozone density model	1
-505.	ozone model, continued	3
-506.	ECC sonde ID and data	1
-507.	ECC data, continued	4
-506.	second ECC ID and data, if available	1
-507.	second ECC data, continued	4
-508.	source of data for solar flux	1
-509.	source of data for diffuser transmission	1
-510.	source of data for detector responsivity	1
-511.	source of Raleigh scattering coefficient	1
-512.	source of ozone absorption coeff., max temp.	1
-513.	source of ozone absorption coeff.,	1
-514.	source of ozone absorption coeff., min temp.	1

For each filter, at each altitude level, are two data records; the number of records per filter or filter ratio varies from 0 to 25.

1xx.	intermediate values in the calculation of ozone	
2xx.	observed ozone with air temp., air press., etc.	

The following records give derived profiles in various units:

300.	composite ozone profile, 1 km per record	10-60
400.	ozone layer content in 12 std. pressure layers	2
500.	ozone at standard (33) pressure levels, 2 levels per record.	17

Maximum number of records: 460.

TAPE FORMATS

Pedigree Records Created by Profile Program

Word	Content
1	-500. Rocoz flight ID; filter ID and calibration
2	XXX.S flight number and segment
3	MMDDYY. month, day, year for creation of this tape
4	number of ECC sondes available: 0., 1., or 2.
5	AAAA (EBCDIC) manufacturer of filter set
6	DDDYY. day of year and year of set assembly
7	filter set identification number
8	MMDDYY. month, day, and year of filter calibration
9	S3 center wavelength, nm
10	S3 bandwidth, nm
11	S3 A0, ozone absorption coeff. from McBride's calibration
12	S3 A1, coeff. for rate of change due to ozone overburden
13	S3 A2, "
14	S3 beta, Rayleigh scattering coefficient
15	S2 center wavelength, nm
16	S2 bandwidth, nm
17	S2 A0, ozone absorption coeff. from McBride's calibration
18	S2 A1, coeff. for rate of change due to ozone overburden
19	S2 A2, "
20	S2 beta, Rayleigh scattering coefficient

1	-501. Dobson data; filter calibration data
2	MMDDYY. month, day, year of Dobson observations
3	AM data, Dobson units; 0.0 if unavailable
4	PM data, Dobson units; 0.0 if unavailable
5	0.0
6	0.0
7	0.0
8	0.0
9	S1 center wavelength, nm
10	S1 bandwidth, nm
11	S1 A0, ozone absorption coeff. from McBride's calibration
12	S1 A1, coeff. for rate of change due to ozone overburden
13	S1 A2, "
14	S1 beta, Rayleigh scattering coefficient
15	S0 center wavelength, nm
16	S0 bandwidth, nm
17	S0 A0, ozone absorption coeff. from McBride's calibration
18	S0 A1, coeff. for rate of change due to ozone overburden
19	S0 A2, "
20	S0 beta, Rayleigh scattering coefficient

Word	Content
1	-502. Datasonde ID and data
2	initial altitude (top) of datasonde profile, km
3	end altitude (bottom) of datasonde profile, km
4	number of levels in datasonde profile
5	AAAA (EBCDIC) Datasonde flight identification
6	AAAA (EBCDIC) " (continued)
7	MMDDYY. month, day, year of datasonde flight
8	HHMM. hour, minute of datasonde launch
9	base altitude for pressure profile, kilometers
10	air pressure at base altitude, millibar
11	acceleration of gravity at latitude of launch site, m/s^2
12	earth radius at launch latitude, km
13	temperature at initial altitude, kelvin
14	temperature at next lower altitude, kelvin
15	"
16	"
17	"
18	"
19	"
20	"

1	-503. Datasonde temperature data, continued
2	temperature at next lower altitude, kelvin
3-20	"

There may be more than one type -503. record, depending on the number of levels at which data are available. Where no more levels are available, the remainder of the words in the record are set to 0.0

Word	Content
1	-504. Model values for ozone overburden
2	initial altitude of model, km (typically, 70.)
3	altitude increment, km (typically, -1.)
4	number of levels
5	AAAA (EBCDIC) model identification
6	AAAA (EBCDIC) (continued)
7	altitude for initial overburden of ozone, km
8	ozone overburden above altitude in word 7, number/m^2
9	ozone number density at the initial altitude, number/m^3
10	ozone number density at next lower altitude
11-20	"

1	-505. Model values, continued
2-20	ozone number density at next lower altitude, or padded with 0.0

There may be 0 - 3 type -505. records, depending upon the model in use.

1	-506. ECC flight ID and data
2	tie-on altitude, typically 20 to 25 km
3	ozone column content, ground to tie-on altitude, atm-cm
4	number of levels of ECC data
5	AAAA (EBCDIC) ECC sonde flight identification
6	AAAA (EBCDIC) (continued)
7	MMDDYY. month, day, year of ECC flight
8	HHMM. hour, minute of ECC launch
9	altitude, beginning near the ground, km
10	air temperature, kelvin
11	air pressure, mbar
12	ozone partial pressure, nanobar
13-20	repeat parameters of words 9-12 for increasing altitude levels.

Data are to be given at 19 standard pressure levels:
1000. 850. 700. 500. 400. 300. 250. 200. 150.
100. 70. 60 50. 40. 30. 25. 20. 15. 10.

If data from a second ECC sonde are available, record types -506. and -507. are to be repeated for the second flight.

TAPE FORMATS

Word	Content
1	-507. ECC data, continued
2	1. or 2., first or second ECC sonde
3	AAAA (EBCDIC) ECC sonde flight identification
4	AAAA (EBCDIC) (continued)
5-20	repeat (altitude, temperature, pressure, ozone) as needed for the remaining standard pressures.

There may be up to four cards of this type for each ECC sonde.

1	-508. source of data for solar flux
2-17	alphanumeric description of data
18	initial wavelength of data, A.
19	end wavelength of data, A.
20	0.0

1	-509. source of data for diffuser transmission.
2-17	alphanumeric description of data.
18	initial wavelength of data, A.
19	end wavelength of data, A.
20	0.0

1	-510. source of data for detector responsivity.
2-17	alphanumeric description of data
18	initial wavelength of data, A.
19	end wavelength of data, A.
20	0.0

1	-511. source of data for Rayleigh scattering coefficient
2-17	alphanumeric description of data
18	initial wavelength of data, A.
19	end wavelength of data, A.
20	0.0

1	-512. source of data for ozone absorption coefficient, room temperature.
2-17	alphanumeric description of data
18	initial wavelength of data, A.
19	end wavelength of data, A.
20	temperature, K

1	-513. source of data for ozone absorption coefficient, lower than than in Pedigree record -512.
2-17	alphanumeric description of data
18	initial wavelength of data, A.
19	end wavelength of data, A.
20	temperature, K

1	-514. source of data for ozone absorption coefficient, lowest available temperature.
2-17	alphanumeric description of data
18	initial wavelength of data, A.
19	end wavelength of data, A.
20	temperature, K

TAPE FORMATS

Data Records Created by Profile Program

Word	Content
1	10f. for word 5 in counts; 1f0. word 5 as ratio to S0 f = filter number: 3, 2, 1, or 0
2	h, altitude, km
3	compensation channel, counts
4	secant/Chapman-function for solar zenith angle
5	(I), intensity at altitude, h, counts or ratio to S0
6	slant ozone overburden, atm-cm
7	slant air mass overburden, atm
8	effective ozone absorption coefficient at h, alpha-eff
9	effective Rayleigh scattering coefficient at h, beta-eff
10	d(ln I)/dh
11	d alpha-eff/d slant-ozone
12	d slant-air/dh
13	optical depth due to slant ozone
14	optical depth due to slant air
15	Fraser correction (for scattered light)
16	noise for delta (ln I)
17	delta-h used by Smooth in deriving I(top) - I(base)
18	B, (absorption + scattering) from Smooth
19	std. dev. of B
20	photometer temperature, degree C

1	20f. from this filter only; 2f0. from ratio to S0 f= filter number: 3, 2, 1, or 0
2	h, altitude, km
3	error in h, percent
4	HHMMSS.S, hours, minutes, seconds, time, GMT
5	solar zenith angle, degrees
6	noise in ozone density, percent, (from d(ln I)/dh noise)
7	ozone density, atm-cm/km
8	ozone density, number/m^3
9	ozone vertical overburden, atm-cm
10	ozone vertical overburden, number/m^2
11	air temperature, kelvin
12	error in air temperature, percent
13	air pressure, millibar
14	error in air pressure, percent
15	air density, number/m^3
16	air, vertical column, atm.
17	ozone, partial pressure, nanobar
18	ozone volume mixing ratio
19	seconds after the hour
20	record number, except for last for this filter, then =-1.

Note: All errors are for one standard deviation.

TAPE FORMATS

The following records appear after all 1rf. and 2rf. records for all filters and ratios have been written.

Word	Content
1	300. Composite Ozone Table (based on all Rocoz filters)
2	h, altitude, km
3	ozone density, atm-cm/km
4	ozone density, number/m^3
5	ozone density, error, percent
6	ozone vertical column, atm-cm
7	ozone vertical column, error, percent
8	air temperature, kelvin
9	air temperature, error, percent
10	air pressure, millibar
11	air pressure, error, percent
12	ozone partial pressure, nanobar
13	ozone partial pressure, error, percent
14	ozone volume mixing ratio, ppm
15	ozone volume mixing ratio, error, percent
16	HHMMSS.S, hours, minutes, seconds, GMT
17	time, seconds after the hour
18	number of filters and/or ratios used at this altitude
19	solar zenith angle, degrees
20	0.0; for last record, -1.

Note: There is one type 300. record for each integer altitude covered by the Rocoz photometer profile.

1	400. These records contains ozone content in 12 standard pressure layers, derived from the Composite Ozone Table given in the type 300. records; where no Rocoz data are available, ECC data are used. If neither is available, words at that level are set to 0.0
2	1., the first of two type 400. records
3	air pressure at top of layer, milliatmospheres
4	ozone content between above pressure altitude and the next pressure altitude, milliatm-cm
5-20	repeat of words 3 and 4 for the next pressure altitude.

1	400. Second record, ozone content in layers
2	2. the second record of this type
3-8	continuation of (air pressure at top, ozone content)
9	1000.
10-20	0.0

Standard pressure altitudes are at 1000./2(nth power) as follows:

0.0 0.24 0.49 0.98 1.95 3.9 7.8 15.6
31. 62. 125. 250. 1000.

Word	Content
1	500. Ozone values at 33 standard pressures levels from Rocoz Composite Table or, at low altitudes, from ECC observations.
2	level number, 1. through 33.
3	standard pressure, lowest value for which ozone data are available, millibar
4	altitude corresponding to pressure in preceding word, km
5	air temperature from datasonde, kelvin
6	Rocoz Composite ozone, number/m^3
7	Rocoz Composite ozone mass mixing ratio
8	air temperature from ECC sonde, kelvin
9	ECC sonde ozone, number/m^3
10	ECC sonde ozone mass mixing ratio
11	500.
12	level number
13-20	repeat of 3-10 for this level, or padded with 0.0 to fill out the record

Standard pressure levels are, in millibars:

						0.05	0.07
0.10	0.15	0.20		0.30	0.40	0.50	0.70
1.0	1.5	2.0		3.0	4.0	5.0	7.0
10.0	15.0	20.0		30.0	40.0	50.0	70.0
100.0	150.0	200.0	250.0	300.0	400.0	500.0	700.0
850.0	1000.0						

If Rocoz, ECC, or datasonde observations are not available at any given pressure level, the corresponding words are set to 0.0.

PROGRAM LISTINGS

26JUL84 08.52.34 - VOL=SACC09, DSN=Z8SAC.RAW.CNTL   MEMBER=JCL

```
//Z8SACRAW JOB (L3006,620,3),'RAW FLT 325',TIME=(0,30)
//*
//* RAW.CNTL(JCL) COMPILES AND RUNS THE RAW PROGRAM USING A
//* VS FORTRAN COMPILER.
//*
/*JOBPARM LINES=20,QUEUE=FETCH
// EXEC FORTVC,PARM=(XREF,NOFIPS)
//SYSIN DD DSN=Z8SAC.RAW.CNTL(RAW),DISP=SHR
// EXEC LINKGOV,REGION.GO=192K
/*
//GO.FT10F001 DD UNIT=(800,,DEFER),LABEL=(,NL,,IN),VOL=SER=ERTAPI,
// DCB=(RECFM=U,BLKSIZE=2440,DEN=2),DISP=(OLD,KEEP)
//GO.DATA5 DD *
KA2130  02  1  0325   (TAPEIN, FILE #, VERSION, FLT #)
001  0025  0030 0000  (# SAMPLES, BEGIN REC., END REC., INCREMNT)
0000.0  0000.0
/*
// EXEC NOTIFYTS
```

*** END OF MEMBER ***   18 RECORDS PROCESSED   ***

26JUL84 08.52.34 - VOL=SACC09, DSN=Z8SAC.RAW.CNTL MEMBER=JCLL

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OF POOR QUALITY

```
//Z8SACRAW JOB (L3006,620,4),'RAW 329',TIME=(0,30)                   00000010
//*                                                                   00000020
//* RAW.CNTL(JCLL) USES THE LIB.LOAD01 (OBJECT CODE) VERSION OF       00000030
//* THE RAW PROGRAM, IN WHICH THE CODE WAS COMPILED WITH A VS         00000040
//* FORTRAN COMPILER.                                                 00000050
//*                                                                   00000060
/*JOBPARM QUEUE=FETCH,LINES=20                                        00000080
//GO       EXEC PGM=MRAW,REGION=512K                                  00000090
//STEPLIB  DD DSN=Z8SAC.LIB.LOAD01,DISP=SHR                           00000100
//FT06F001 DD SYSOUT=*                                                00000110
//SYSUDUMP DD SYSOUT=*,SPACE=(CYL,(1,1))                              00000120
//SYSABEND DD SYSOUT=*,SPACE=(CYL,(1,1))                              00000130
//FT05F001 DD DDNAME=DATA5                                            00000140
/*                                                                    00000150
//GO.FT10F001 DD UNIT=(800,,DEFER),LABEL=(4,NL,,IN),VOL=SER=ERTAPI,   00000160
// DCB=(RECFM=U,BLKSIZE=2440,DEN=2,EROPT=SKP),DISP=(OLD,KEEP)         00000170
//GO.DATA5 DD *                                                       00000180
KA2125  04  1  0329       (TAPEIN, FILE #, VERSION #, FLT #)          00000190
040  0001  0003 0050      (# SAMPLES, BEGIN REC #, END REC #,INCREMNT )00000200
0000.0  0000.0                                                        00000210
/*                                                                    00000220
// EXEC NOTIFYTS                                                      00000230

*** END OF MEMBER ***     22 RECORDS PROCESSED    **********************************************************************
```

```
//Z8SACRAD JOB (L3006,620,4),'SAC RADAR 291',TIME=(1,0)              00000010
//*                                                                   00000020
//* RADAR.CNTL(JCL) COMPILES AND RUNS THE RADAR PROGRAM USING         00000030
//* A FORTRAN H COMPILER. (NOTE: THIS JCL CAN ONLY BE USED ON         00000040
//* MESSUP RADAR TAPES)                                               00000050
//*                                                                   00000060
// EXEC OFORTH,PARM=XREF                                              00000070
//SOURCE.SYSIN DD DSN=Z8SAC.RADAR.CNTL(RADAR),DISP=SHR                00000080
// EXEC OLINKGOH,REGION.GO=200K                                       00000090
//GO.FT10F001 DD UNIT=(2400-7,,DEFER),LABEL=(,NL,,IN),VOL=SER=ERTAPI, 00000100
// DCB=(RECFM=F,BLKSIZE=252,DEN=2,TRTCH=ET,LRECL=252,EROPT=ACC),      00000110
//   DISP=(OLD,KEEP)                                                  00000120
//GO.FT11F001 DD UNIT=(2400-9,,DEFER),LABEL=(,SL,,OUT),VOL=SER=ERTAPO, 00000130
// DCB=(RECFM=FB,BLKSIZE=5200,DEN=3,LRECL=52),DISP=(NEW,KEEP)         00000140
//GO.DATA5 DD *                                                       00000150
 KA2131      10   01   02    1680.00   291    00/00/81                00000160
 KA2113      11   01                                                  00000170
 101.  02/26/81  162800.0  +37.850   -75.480  WALLOPS ISLAND          00000180
/*                                                                    00000190
// EXEC NOTIFYTS                                                      00000200

*** END OF MEMBER ***     20 RECORDS PROCESSED   *****************************************************************
```

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OF POOR QUALITY

```
//Z8SACRAD JOB (L3006,620,4),'COPY RADAR 291',TIME=(1,0)
//*
//* RADAR.CNTL(JCLCPY) COMPILES AND RUNS THE COPY1 VERSION OF THE
//* RADAR PROGRAM, USING A FORTRAN H COMPILER.
//*
/*JOBPARM QUEUE=FETCH
// EXEC OFORTH,PARM=XREF
//SOURCE.SYSIN DD DSN=Z8SAC.RADAR.CNTL(COPY1),DISP=SHR
// EXEC OLINKGOH,REGION.GO=200K
//GO.FT10F001 DD UNIT=(2400-9,,DEFER),LABEL=(,SL,,IN),VOL=SER=ERTAPI,
// DCB=(RECFM=FB,BLKSIZE=5200,DEN=3,LRECL=52,EROPT=ACC),
// DISP=(OLD,KEEP),DSN=Z8SACRAD.R0000005
//GO.FT11F001 DD UNIT=(2400-9,,DEFER),LABEL=(,SL,,OUT),VOL=SER=ERTAPO,
// DCB=(RECFM=FB,BLKSIZE=5200,DEN=3,LRECL=52),DISP=(NEW,KEEP),
// DSN=Z8SAC.RADAR291
//GO.DATA5 DD *
 KA2113      10    01    01     1680.00
 KA2115      11    01
/*
// EXEC NOTIFYTS
```

*** END OF MEMBER ***   20 RECORDS PROCESSED   **

```
//Z8SACRDR JOB (L3006,620,10),'SACRAD 312,314,315',TIME=(0,30)         00000010
//*                                                                    00000020
//* RADAR.CNTL(JCLL) USES THE LIB.LOAD01 (OBJECT CODE) VERSION         00000030
//* OF THE RADAR PROGRAM, WHICH WAS COMPILED WITH A FORTRAN H          00000040
//* COMPILER. THIS JCL ALSO ALLOWS ONE TO RUN MULTIPLE FLIGHTS.        00000050
//* (NOTE: THIS JCL CAN ONLY BE USED ON MESSUP RADAR TAPES)            00000052
//*                                                                    00000055
/*JOBPARM LINES=20,QUEUE=FETCH                                         00000060
//STEP1 EXEC OLINKGOH,REGION.GO=200K                                   00000070
//LINK.SYSLIB DD DSN=Z8SAC.LIB.LOAD01,DISP=SHR                         00000080
//LINK.SYSLIN DD *                                                     00000090
 INCLUDE SYSLIB(MRAD)                                                  00000100
 ENTRY MRAD                                                            00000110
//GO.FT10F001 DD UNIT=(2400-7,,DEFER),LABEL=(,NL,,IN),VOL=SER=ERTAPI,  00000120
// DCB=(RECFM=F,BLKSIZE=252,DEN=2,TRTCH=ET,LRECL=252,EROPT=ACC),       00000130
//   DISP=(OLD,KEEP)                                                   00000140
//GO.FT11F001 DD UNIT=(2400-9,,DEFER),LABEL=(22,SL,,OUT),              00000150
// DCB=(RECFM=FB,BLKSIZE=5200,DEN=3,LRECL=52),DISP=(NEW,KEEP),         00000160
// VOL=SER=ERTAPO,DSN=Z8SAC.RADAR312                                   00000170
//GO.DATA5 DD *                                                        00000180
 KA2130      10   01   02    0420.00   312   07/20/82                  00000190
 KA2120      11   22                                                   00000200
 102.  06/11/82  800700.0   65.120  -147.480  POKER FLATS, AK          00000210
/*                                                                     00000220
// EXEC GO,STEP=STEP1,REGION.GO=200K                                   00000230
//GO.FT10F001 DD UNIT=(2400-7,,DEFER),LABEL=(,NL,,IN),VOL=SER=ERTAPI,  00000240
// DCB=(RECFM=F,BLKSIZE=252,DEN=2,TRTCH=ET,LRECL=252,EROPT=ACC),       00000250
//   DISP=(OLD,KEEP)                                                   00000260
//GO.FT11F001 DD UNIT=(2400-9,,DEFER),LABEL=(23,SL,,OUT),              00000270
// DCB=(RECFM=FB,BLKSIZE=5200,DEN=3,LRECL=52),DISP=(NEW,KEEP),         00000280
// VOL=SER=ERTAPO,DSN=Z8SAC.RADAR314                                   00000290
//GO.DATA5 DD *                                                        00000300
 KA2131      10   01   02    1920.00   314   07/20/82                  00000310
 KA2120      11   23                                                   00000320
 102.  06/11/82  233200.0   65.120  -147.480  POKER FLATS, AK          00000330
/*                                                                     00000340
// EXEC GO,STEP=STEP1,REGION.GO=200K                                   00000350
//GO.FT10F001 DD UNIT=(2400-7,,DEFER),LABEL=(,NL,,IN),VOL=SER=ERTAPI,  00000360
// DCB=(RECFM=F,BLKSIZE=252,DEN=2,TRTCH=ET,LRECL=252,EROPT=ACC),       00000370
//   DISP=(OLD,KEEP)                                                   00000380
//GO.FT11F001 DD UNIT=(2400-9,,DEFER),LABEL=(24,SL,,OUT),              00000390
// DCB=(RECFM=FB,BLKSIZE=5200,DEN=3,LRECL=52),DISP=(NEW,KEEP),         00000400
// VOL=SER=ERTAPO,DSN=Z8SAC.RADAR315                                   00000410
//GO.DATA5 DD *                                                        00000420
 KA2132      10   01   02    1200.00   315   07/20/82                  00000430
 KA2120      11   24                                                   00000440
 102.  06/12/82  232000.0   65.120  -147.480  POKER FLATS, AK          00000450
/*                                                                     00000460

*** END OF MEMBER ***     48 RECORDS PROCESSED   ******************************************************
```

```
//Z8SACRD2 JOB (L3006,620,4),'LIST RADAR 324',TIME=(1,0)
//*
//* RADAR.CNTL(LISTJCL) COMPILES AND RUNS THE LISTRAD PROGRAM
//* (THE RADAR PROGRAM USED FOR ALL PASS1 RADAR TAPES), USING A
//* VS FORTRAN COMPILER.
//*
/*JOBPARM QUEUE=FETCH
// EXEC FORTVC,PARM=XREF
//SYSIN DD DSN=Z8SAC.RADAR.CNTL(LISTRAD),DISP=SHR
// EXEC LINKGOV,REGION.GO=200K
//GO.FT10F001 DD UNIT=(800,,DEFER),LABEL=(2,NL,,IN),VOL=SER=ERTAPI,
// DCB=(RECFM=FB,BLKSIZE=32,DEN=2,LRECL=32,EROPT=ACC),
//    DISP=(OLD,KEEP)
//GO.DATA5 DD *
 324  102783.  KA2126  02   (FLT #, LAUNCH DATE MMDDYY., TAPEIN, FILE #)
/*
// EXEC NOTIFYTS

*** END OF MEMBER ***     17 RECORDS PROCESSED   ************************************************************************
```

```
//Z8SACRAD JOB (L3006,620,4),'LIST RADAR 329',TIME=(1,0)
//*
//* RADAR.CNTL(LISTJCLL) USES THE LIB.LOAD01 (OBJECT CODE) VERSION
//* OF THE LISTRAD PROGRAM (THE RADAR PROGRAM USED FOR ALL PASS1
//* RADAR TAPES), WHICH HAS COMPILED WITH A VS FORTRAN COMPILER.
//*
/*JOBPARM QUEUE=FETCH
//GO       EXEC PGM=LISTRAD,REGION=512K
//STEPLIB  DD DSN=Z8SAC.LIB.LOAD01,DISP=SHR
//FT06F001 DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*,SPACE=(CYL,(1,1))
//SYSABEND DD SYSOUT=*,SPACE=(CYL,(1,1))
//FT05F001 DD DDNAME=DATA5
/*
//GO.FT10F001 DD UNIT=(800,,DEFER),LABEL=(2,NL,,IN),VOL=SER=ERTAPI,
// DCB=(RECFM=FB,BLKSIZE=32,DEN=2,LRECL=32,EROPT=ACC),
//    DISP=(OLD,KEEP)
//GO.DATA5 DD *
 329  020984.  KA2125  02   (FLT 0, LAUNCH DATE MMDDYY., TAPEIN, FILE 0)
/*
// EXEC NOTIFYTS
```

*** END OF MEMBER ***   21 RECORDS PROCESSED   **

```
//Z8SACRDR JOB (L3006,620,3),'SACRAD 316',TIME=(0,30)
//*
//* RADAR.CNTL(SPJCL) USES THE LIB.LOAD01 (OBJECT CODE) VERSION
//* OF THE RADAR PROGRAM, WHICH HAS COMPILED WITH A FORTRAN H
//* COMPILER. (NOTE: THIS JCL CAN ONLY BE USED ON MESSUP RADAR TAPES)
//*
/*JOBPARM LINES=20,QUEUE=FETCH
// EXEC OLINKGOH,REGION.GO=200K
//LINK.SYSLIB DD DSN=Z8SAC.LIB.LOAD01,DISP=SHR
//LINK.SYSLIN DD *
 INCLUDE SYSLIB(MRAD)
 ENTRY MRAD
//GO.FT10F001 DD UNIT=(800,,DEFER),LABEL=(,NL,,IN),VOL=SER=ERTAPI,
// DCB=(RECFM=F,BLKSIZE=252,DEN=2,LRECL=252,EROPT=ACC),
//    DISP=(OLD,KEEP)
//GO.FT11F001 DD UNIT=(2400-9,,DEFER),LABEL=(25,SL,,OUT),
// DCB=(RECFM=FB,BLKSIZE=5200,DEN=3,LRECL=52),DISP=(NEW,KEEP),
// VOL=SER=ERTAPO,DSN=Z8SAC.RADAR316
//GO.DATA5 DD *
 KA2127       10   01   02    1500.00    316    09/15/83
 KA2120       11   25
 101.  08/23/83  162500.0   37.850   -75.480  WALLOPS ISLAND
/*
// EXEC NOTIFYTS
```

*** END OF MEMBER ***   24 RECORDS PROCESSED   **

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26JUL84 08.52.34 - VOL=SACC09, DSN=Z8SAC.EDIT.CNTL   MEMBER=JCL

```
//Z8SACEDT JOB (L3006,620,4),'EDIT FLT 320',TIME=(1,00)
//*
//* EDIT.CNTL(JCL) COMPILES AND RUNS THE EDIT PROGRAM USING A
//* FORTRAN H COMPILER.
//*
/*JOBPARM LINES=20,QUEUE=FETCH
// EXEC OFORTH,PARM=XREF
//SOURCE.SYSIN DD DSN=Z8SAC.EDIT.CNTL(EDIT),DISP=SHR
// EXEC OLINKGOH,REGION.GO=300K
//GO.PLOTTAPE DD DCB=(,DEN=1),LABEL=(,BLP,,OUT),
//  UNIT=(7TRACK,,DEFER),DISP=NEW,VOL=SER=KA2110,DSN=NULLFILE
//GO.FT10F001 DD UNIT=(800,,DEFER),LABEL=(4,NL,,IN),
//  DCB=(RECFM=U,BLKSIZE=2440,DEN=2,EROPT=ACC),VOL=SER=ERTAPI,
//  DISP=(OLD,KEEP)
//GO.FT15F001 DD UNIT=(2400-9,,DEFER),LABEL=(5,SL,,OUT),
//   DCB=(RECFM=FB,DEN=3,BLKSIZE=8000,LRECL=80),
//   VOL=SER=ERTAPO,DISP=(NEW,KEEP),DSN=Z8SAC.EDIT320
//GO.DATA5 DD *
KA2130  INPUT   10  04
KA2115  OUTPUT  15  05  080
00.629  105  373  128  030  (DELTAT,IREC,MPEAK,LPEAK,LIMIT)
  6.5  654.00  5.6  564.00  (B1,V1,B2,V2)
-19.0    9.78 23.0    4.03 50.0    1.71  (TEMP CAL. - T(I),VT(I),I=1,3)
320.0  479.  10/24/83        (FLT. #, PAYLOAD #, DATE RAW TAPE REC'D)
/*
// EXEC NOTIFYTS
```

*** END OF MEMBER ***   26 RECORDS PROCESSED   **

```
26JUL84 08.52.34 - VOL=SACC09, DSN=Z8SAC.EDIT.CNTL                                MEMBER=JCLL

//Z8SACEDT JOB (L3006,620,4),'EDIT 329',TIME=(1,0)                    00000010
//*                                                                   00000012
//* EDIT.CNTL(JCLL) USES THE LIB.LOAD01 (OBJECT CODE) VERSION         00000014
//* OF EDIT, WHICH WAS COMPILED WITH A FORTRAN H COMPILER.            00000016
//*                                                                   00000018
/*JOBPARM QUEUE=FETCH,LINES=20                                        00000020
// EXEC OLINKGOH,REGION.GO=300K                                       00000030
//LINK.SYSLIB DD DSN=Z8SAC.LIB.LOAD01,DISP=SHR                        00000040
// DD DSN=SYS2.WOLFPLOT,DISP=SHR                                      00000050
//LINK.SYSLIN DD *                                                    00000060
 INCLUDE SYSLIB(MEDIT)                                                00000070
 ENTRY MEDIT                                                          00000080
/*                                                                    000C3090
//GO.PLOTTAPE DD DCB=(,DEN=1),LABEL=(,BLP,,OUT),                      00000100
// UNIT=(7TRACK,,DEFER),DISP=NEW,VOL=SER=KA2110,DSN=NULLFILE          00000110
//GO.FT10F001 DD UNIT=(800,,DEFER),LABEL=(4,NL,,IN),                  00000120
//   DCB=(RECFM=U,BLKSIZE=2440,DEN=2,EROPT=SKP),VOL=SER=ERTAPI,       00000130
//   DISP=(OLD,KEEP)                                                  00000140
//GO.FT15F001 DD UNIT=(2400-9,,DEFER),LABEL=(37,SL,,OUT),             00000150
//    DCB=(RECFM=FB,DEN=3,BLKSIZE=8000,LRECL=80),                     00000160
//    VOL=SER=ERTAPO,DISP=(NEW,KEEP),DSN=Z8SAC.EDIT329                00000170
//GO.DATA5 DD *                                                       00000180
KA2125  INPUT   10  04                                                00000190
KA2122  OUTPUT  15  37  080                                           00000200
00.649  093  559  143  030     (DELTAT,IREC,MPEAK,LPEAK,LIMIT)        00000210
  6.5  648.00  5.6  540.00     (B1,V1,B2,V2)                          00000220
-20.0     9.95 23.0    4.24 50.0    1.77   (T(1),VT(1),....T(3),VT(3))  00000230
329.0  490.   03/05/84         (FLT.NO.,PAYLOAD,DATE TAPE R'CD)       00000240
/*                                                                    00000250
// EXEC NOTIFYTS                                                      00000260

*** END OF MEMBER ***     30 RECORDS PROCESSED    ***********************************************************************
```

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```
//Z8SACEDT JOB (L3006,620,2),'SPECIAL EDIT 306',TIME=(0,30)
//*
//*  THIS JCL IS USED IN SPECIAL CASES WHERE ONE WANTS TO
//* RUN THE LIB.LOAD01 (OBJECT CODE COMPILED WITH FORTRAN H
//* COMPILER) VERSION OF EDIT BUT WANTS TO USE A SEPARATE
//* SOURCE CODE SUBROUTINE (BLOCK1, IN THIS CASE). IN
//* EDIT.CNTL(BLOCK1), ONE CAN STOP PROCESSING AFTER A CERTAIN
//* RECORD HAS BEEN REACHED.
//*
/*JOBPARM QUEUE=FETCH,LINES=20
//SOURCE EXEC OFORTH,PARM=XREF
//SOURCE.SYSIN DD DISP=SHR,DSN=Z8SAC.EDIT.CNTL(BLOCK1)
//LOAD EXEC OLINKGOH,REGION.GO=300K
//LINK.SYSLIB DD DSN=Z8SAC.LIB.LOAD01,DISP=SHR
// DD DSN=SYS2.WOLFPLOT,DISP=SHR
//LINK.OBJECT DD *
 INCLUDE SYSLIB(MEDIT)
 ENTRY MEDIT
/*
//GO.PLOTTAPE DD DCB=(,DEN=1),LABEL=(,BLP,,OUT),
// UNIT=(7TRACK,,DEFER),DISP=NEW,VOL=SER=KA2110,DSN=NULLFILE
//GO.FT10F001 DD UNIT=(800,,DEFER),LABEL=(,NL,,IN),
//   DCB=(RECFM=U,BLKSIZE=2440,DEN=2,EROPT=ACC),VOL=SER=ERTAPI,
//   DISP=(OLD,KEEP)
//GO.FT15F001 DD DUMMY,
//    DCB=(RECFM=FB,DEN=3,BLKSIZE=8000,LRECL=80),
//    VOL=SER=ERTAPO,DISP=(NEW,KEEP),DSN=Z8SAC.EDIT306
//GO.DATA5 DD *
KA2126  INPUT   10  01
KA2144  OUTPUT  15  01  080
00.609  113  557  145  030
  6.5  652.00  5.6  562.00
-20.0   10.02 22.0    4.23 50.0    1.76
306.0  460.  09/13/82
/*
// EXEC NOTIFYTS
```

*** END OF MEMBER ***   36 RECORDS PROCESSED   **

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OF POOR QUALITY

```
//Z8SACMER JOB (L3006,620,4),'MERGE FLT 321',TIME=(0,30)
//*
//* MERGE.CNTL(JCL) COMPILES AND RUNS THE MERGE PROGRAM USING
//* A VS FORTRAN COMPILER.
//*
/*JOBPARM QUEUE=FETCH
// EXEC FORTVC,PARM=(XREF,NOFIPS,NOTRMFLG)
//SYSIN DD DSN=Z8SAC.MERGE.CNTL(MERGE),DISP=SHR
// EXEC LINKGOV,REGION.GO=450K
//GO.FT15F001 DD UNIT=(2400-9,,DEFER),LABEL=(29,SL,,IN),
//    VOL=SER=EDITED,DCB=(RECFM=FB,DEN=3,BLKSIZE=8000,LRECL=80),
//    DISP=(OLD,KEEP),DSN=Z8SAC.EDIT321
//GO.FT10F001 DD UNIT=(2400-9,,DEFER),LABEL=(1,SL,,OUT),
// VOL=SER=MERGED,DCB=(RECFM=FB,DEN=3,BLKSIZE=8000,LRECL=80),
//    DISP=(NEW,KEEP),DSN=Z8SAC.MER321
//GO.FT16F001 DD UNIT=(800,,DEFER),LABEL=(1,NL,,IN),
//    VOL=SER=RADAR,DCB=(RECFM=FB,DEN=2,BLKSIZE=32,LRECL=32),
//    DISP=(OLD,KEEP),DSN=Z8SAC.RAJAR321
//GO.DATA5 DD *
 KA2122       29   15    00  (EDIT VOLSER #, FILE #, UNIT #)
 KA2138       01   10        (MERGE VOLSER #, FILE #, UNIT #)
 KA2126       01   16    02  (RADAR VOLSER #, FILE #, UNIT #, MODE)
321.0
1  WFC-1 CRR-2 NTL-3 PRL-4 0000.0  001  00  321  OCT.  27, 1983 1624Z
               14.00      03.00      7.16    230.83    (RH,RM,RS,RACOR)
              -12.00      30.00     39.00  -1221.40    (DD,DM,DS,DECOR)
                2.00      19.00      8.88     16.00    (SH,SM,SS,HOUR)
0000.0  0000.0
0000.0  0000.0
0000.0  0000.0
//* THE FOLLOWING DATA LINES ARE USED FOR THE NEW PASS1 RADAR TAPES,
//* (FLIGHTS 316 AND ON) TO READ IN RADAR PEDIGREE INFORMATION DUE TO
//* THE RADAR TAPES BEING READ DIRECTLY INTO THE MERGE PROGRAM WITHOUT
//* BEING PREVIOUSLY REFORMATTED BY THE RADAR PROGRAM. THESE DATA
//* LINES ARE READ WHEN MODE 2 IS SPECIFIED. THE FOLLOWING FIELDS ARE:
//*
//*  -100.,FLT #,LAUNCH VEHICLE/SITE,LAUNCH DATE,LAUNCH TIME,LATITUDE,
//*    LONGITUDE,DATE RADAR TAPE REC'D
//GO.FT20F001 DD *
-100.  321.  101.  102783.  162400.0   37.850   -75.480  021584.
WALLOPS ISLAND    1440.00  (SITE,STIME)
/*
// EXEC NTSO
```

*** END OF MEMBER ***   43 RECORDS PROCESSED   ***

```
//Z8SACMER JOB (L3006,620,4),'MERGE FLT 329',TIME=(0,30)
//*
//* MERGE.CNTL(JCLL) USES THE LIB.LOAD01 (OBJECT CODE) VERSION
//* OF THE MERGE PROGRAM, IN WHICH THE CODE WAS COMPILED WITH A
//* VS FORTRAN COMPILER.
//*
/*JOBPARM QUEUE=FETCH
//GO        EXEC PGM=MMERGE,REGION=512K
//STEPLIB   DD DSN=Z8SAC.LIB.LOAD01,DISP=SHR
//FT06F001 DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*,SPACE=(CYL,(1,1))
//SYSABEND DD SYSOUT=*,SPACE=(CYL,(1,1))
//FT05F001 DD DDNAME=DATA5
//GO.FT15F001 DD UNIT=(2400-9,,DEFER),LABEL=(37,SL,,IN),
//    VOL=SER=EDITED,DCB=(RECFM=FB,DEN=3,BLKSIZE=8000,LRECL=80),
//    DISP=(OLD,KEEP),DSN=Z8SAC.EDIT329
//GO.FT10F001 DD UNIT=(2400-9,,DEFER),LABEL=(36,SL,,OUT),
//    VOL=SER=MERGED,DCB=(RECFM=FB,DEN=3,BLKSIZE=8000,LRECL=80),
//    DISP=(NEW,KEEP),DSN=Z8SAC.MER329
//GO.FT16F001 DD UNIT=(800,,DEFER),LABEL=(2,NL,,IN),
//    VOL=SER=RADAR,DCB=(RECFM=FB,DEN=2,BLKSIZE=32,LRECL=32),
//    DISP=(OLD,KEEP),DSN=Z8SAC.RADAR329
//GO.DATA5 DD *
 KA2122        37   15   00  (EDIT VOLSER #, FILE #, UNIT #)
 KA2117        36   10       (MERGE VOLSER #, FILE #, UNIT #)
 KA2125        02   16   02  (RADAR VOLSER #, FILE #, UNIT #, MODE)
329.0
1  WFC-1 CRR-2 NTL-3 PRL-4 0000.0  001  00   329  FEB.  09, 1984 1845Z
               21.00      27.00      21.67     238.59    (RH,RM,RS,RACOR)
              -14.00      59.00      52.90    1148.10    (DD,DM,DS,DECOR)
                9.00      13.00      07.43      18.00    (SH,SM,SS,HOUR)
0000.0  0000.0
0000.0  0000.0
0000.0  0000.0
//* THE FOLLOWING DATA LINES ARE USED FOR THE NEW PASS1 RADAR TAPES,
//* (FLIGHTS 316 AND ON) TO READ IN RADAR PEDIGREE INFORMATION DUE TO
//* THE RADAR TAPES BEING READ DIRECTLY INTO THE MERGE PROGRAM WITHOUT
//* BEING PREVIOUSLY REFORMATTED BY THE RADAR PROGRAM. THESE DATA
//* LINES ARE READ WHEN MODE 2 IS SPECIFIED. THE FOLLOWING FIELDS ARE:
//*
//*  -100.,FLT #,LAUNCH VEHICLE/SITE,LAUNCH DATE,LAUNCH TIME,LATITUDE,
//*    LONGITUDE,DATE RADAR TAPE REC'D
//GO.FT20F001 DD *
-100.  329.  101.  020984.  184500.0   37.850   -75.480  030584.
WALLOPS ISLAND     2700.00  (SITE,STIME)
/*
// EXEC NTSO
```

*** END OF MEMBER ***   47 RECORDS PROCESSED   ***

```
//Z8SACSMO JOB (L3006,620,7),'SMOOTH FLT 326',TIME=(0,30)                  00000010
//*                                                                         00000012
//* SMOO.CNTL(JCL) COMPILES AND RUNS THE SMOOTH PROGRAM USING               00000014
//* A FORTRAN H COMPILER.                                                   00000016
//*                                                                         00000018
/*JOBPARM QUEUE=FETCH                                                       00000020
// EXEC OFORTH,PARM='XREF'                                                  00000030
//SOURCE.SYSIN DD DSN=Z8SAC.SMOO.CNTL(SMOOTH),DISP=SHR                      00000040
// EXEC OLINKGOH,REGION.GO=300K                                             00000050
//LINK.SYSLIB DD DSN=SYS2.WOLFPLOT,DISP=SHR                                 00000060
/*                                                                          00000070
//GO.PLOTTAPE DD DCB=(,DEN=1),LABEL=(,BLP,,OUT),UNIT=(7TRACK,,DEFER),       00000080
//    DISP=NEW,VOL=SER=KA2110,DSN=NULLFILE                                  00000090
//GO.FT10F001 DD UNIT=(2400-9,,DEFER),LABEL=(33,SL,,IN),                    00000100
//    DCB=(RECFM=FB,BLKSIZE=8000,LRECL=80),VOL=SER=ERTAPI,                  00000110
//    DISP=(OLD,KEEP),DSN=Z8SAC.MER326                                      00000115
//GO.FT15F001 DD UNIT=(2400-9,,DEFER),LABEL=(2,SL,,OUT),                    00000120
//    DISP=(NEW,KEEP),DCB=(RECFM=FB,BLKSIZE=4000,LRECL=80),                 00000130
//    VOL=SER=ERTAPO,DSN=Z8SAC.SMOO326                                      00000135
//GO.FT03F001 DD UNIT=SYSDA,SPACE=(TRK,(58,5)),DISP=(NEW,DELETE),           00000140
//    DCB=(RECFM=FB,LRECL=80,BLKSIZE=7280),DSN=MERGEXXX                     00000150
//GO.DATA5 DD *                                                             00000160
KA2117   33  10  80                                                         00000170
KA2138   02  15                                                             00000180
00(MODE:1-INSTRUM, 0-NONE,-1-STATIST      )  1-(S0 REFERENCE; 0-NO,1-YES)00000190
  69.0   13.0  213.   0051   (ALT. RANGE-KM,COMPMN,# BAD MERGE RECS)        00000200
0000.0  0000.0  0000.4  0001.4  (ZERO OFFSETS: S0,S1,S2,S3)                 00000210
0014.0  0002.0  0000.4  0001.3  (TA,TB,S2B,S3B)                             00000212
326.                                                                        00000215
/*                                                                          00000220
// EXEC NTSO                                                                00000230

*** END OF MEMBER ***     31 RECORDS PROCESSED    ***************************************************************
```

```
//Z8SACSMO JOB (L3006,620,6),'TEST2 SMOOTH 327',TIME=(0,30)
//*
//* SMOO.CNTL(JCLL) USES THE LIB.LOAD01 (OBJECT CODE) VERSION
//* OF THE SMOOTH PROGRAM, WHICH WAS COMPILED WITH A FORTRAN H
//* COMPILER.
//*
/*JOBPARM QUEUE=FETCH
// EXEC OLINKGOH,REGION.GO=300K
//LINK.SYSLIB DD DSN=SYS2.WOLFPLOT,DISP=SHR
//             DD DSN=Z8SAC.LIB.LOAD01,DISP=SHR
//LINK.SYSLIN DD *
 INCLUDE SYSLIB(MSMOOT)
 ENTRY MSMOOT
/*
//GO.PLOTTAPE DD DCB=(,DEN=1),LABEL=(,BLP,,OUT),UNIT=(7TRACK,,DEFER),
//    DISP=NEW,VOL=SER=KA2110,DSN=NULLFILE
//GO.FT10F001 DD UNIT=(2400-9,,DEFER),LABEL=(34,SL,,IN),
//    DISP=(OLD,KEEP),DCB=(RECFM=FB,BLKSIZE=8000,LRECL=80),
//    VOL=SER=ERTAPI,DSN=Z8SAC.MER327
//GO.FT15F001 DD UNIT=(2400-9,,DEFER),LABEL=(3,SL,,OUT),
//    DISP=(NEW,KEEP),DCB=(RECFM=FB,BLKSIZE=4000,DEN=3,LRECL=80),
//    VOL=SER=ERTAPO,DSN=Z8SAC.SMOO327
//GO.FT03F001 DD UNIT=SYSDA,SPACE=(TRK,(58,5)),DISP=(NEW,DELETE),
//    DCB=(RECFM=FB,LRECL=80,BLKSIZE=7280),DSN=MERGEXXX
//GO.DATA5 DD *
KA2117  34  10  80
KA2123  03  15
00(MODE:1-INSTRUM, 0-NONE,-1-STATIST      )  1-(S0 REFERENCE; 0-NO,1-YES)
  66.0  10.0  208.  0058   (ALT. RANGE-KM,COMPMN,# BAD MERGE RECS)
0000.0  0002.0  0011.0  0021.0  (ZERO OFFSETS: S0,S1,S2,S3)
0011.0  0011.0  0011.0  0021.0  (TA,TB,S2B,S3B)
327.
/*
// EXEC NTSO
```

*** END OF MEMBER ***   34 RECORDS PROCESSED   **>*********

```
//L3EIRPRO JOB (L3006,620,4),' FLT 325 PROFILE',TIME=(2,00)             00000010
/*JOBPARM QUEUE=FETCH                                                   00000020
// EXEC OFORTH,PARM='NCAL,XREF'                                         00000030
//SOURCE.SYSIN DD DSN=L3EIR.PROF.CNTL(PROFILE),DISP=SHR                 00000040
//             DD DSN=L3EIR.PROF.CNTL(DINARRY),DISP=SHR                 00000050
// EXEC OLINKGOH,REGION.GO=300K                                         00000070
//LINK.SYSLIB DD DSN=SYS2.WOLFPLOT,DISP=SHR                             00000080
//            DD DSN=L3EIR.LIB.LOAD01,DISP=SHR                          00000090
/*                                                                      00000100
//GO.FT09F001 DD SYSOUT=A                                               00000110
//GO.FT10F001 DD UNIT=(2400-9,,DEFER),LABEL=(10,SL,,IN),                00000120
// VOL=SER=ERTAPI,DISP=(OLD,KEEP),DSN=Z8SAC.SM00325,                    00000130
// DCB=(RECFM=FB,DEN=3,BLKSIZE=4000,LRECL=80,EROPT=SKP)                 00000140
//GO.FT15F001 DD UNIT=(2400-9,,DEFER),LABEL=(10,SL,,OUT),               00000150
// DCB=(RECFM=FB,DEN=3,BLKSIZE=4000,LRECL=80),VOL=SER=ERTAPO,           00000160
// DISP=(NEW,KEEP),DSN=L3EIR.PROF325                                    00000170
//*                                                                     00000180
//*    THE FOLLOWING DISK FILES WILL ONLY BE USED WHEN NOT PRECEDED BY  00000190
//*  '//*': (IN ORDER TO USE THESE DISK FILES, CHANGE '//*GO' TO '//GO')00000200
//*GO.FT31F001 DD DSN=L6VBZ.NCFLUX,DISP=SHR,LABEL=(,,,IN)               00000210
//*GO.FT32F001 DD DSN=L6VBZ.DIFFSR,DISP=SHR,LABEL=(,,,IN)               00000220
//*GO.FT33F001 DD DSN=L6VBZ.DETECT,DISP=SHR,LABEL=(,,,IN)               00000230
//*GO.FT34F001 DD DSN=L6VBZ.RAYLEIGH,DISP=SHR,LABEL=(,,,IN)             00000240
//*GO.FT35F001 DD DSN=L6VBZ.MCBRIDE,DISP=SHR,LABEL=(,,,IN)              00000250
//*GO.FT36F001 DD DSN=L6VBZ.BAS,DISP=SHR,LABEL=(,,,IN)                  00000260
//*GO.FT37F001 DD DSN=L6VBZ.BASS243,DISP=SHR,LABEL=(,,,IN)              00000270
//GO.DATA5 DD *                                                         00000280
A 325.0  KA2116  010    KA2113  010    00/00/83 BARR 00000 000489       00000290
B 03 58.0 39.0  2653.0 133.0  194.8620 -3073.27000 -23416.40000 2.07930 00000300
B 02 49.0 30.0  2923.0  91.0   32.7789    -72.54570    158.06100 1.36420 00000310
B 01 44.0 19.0  3008.0  71.0    8.2503     -3.86985      2.06072 1.20600 00000320
B 00 40.0 19.0  3067.0  68.0    3.1370     -0.50358       .07242 1.10980 00000330
B 30 58.0 39.0                191.7250 -3072.76650 -23416.47242 0.96950 00000340
B 20 49.0 30.0                 29.6419    -72.04212    157.98858 0.25440 00000350
B 10 44.0 19.0                  5.1134     -3.36627      1.98830 0.09620 00000360
C 11/22/83  260.0  253.0   DOBSON DATA AND VALUES - MILLI-ATM-CM        00000370
D  T1-0771  11/22/83  1530  060  18666.0  205.10   70.00 DATASONDE      00000380
E 70000.   -38.70   15.0   ALT(M)     TEMP C ; TEMP ERROR (TWO SIGMA),DEG.00000390
E 69000.   -40.60   13.0 IF NOT GIVEN WITH PROFILE, ERROR MAY BE TAKEN  00000400
E 68000.   -40.70   11.4 FROM SCHMIDLIN, JGR,86,9599,1981.              00000410
E 67000.   -36.90    9.9 ALTITUDE MUST BE DESCENDING.                   00000420
E 66000.   -33.10    8.6                                                00000430
E 65000.   -28.90    7.5                                                00000440
E 64000.   -26.10    6.3                                                00000450
E 63000.   -23.80    5.4                                                00000460
E 62000.   -21.90    4.6                                                00000470
E 61000.   -19.70    3.9                                                00000480
E 60000.   -20.20    3.3                                                00000490
E 59000.   -18.00    3.9                                                00000500
E 58000.   -14.40    2.6                                                00000510
E 57000.   -11.40    2.3                                                00000520
E 56000.   -16.70    2.0                                                00000530
E 55000.   -17.80    1.8                                                00000540
E 54000.   -16.50    1.8                                                00000550
E 53000.   -16.80    1.8                                                00000560
E 52000.   -16.70    1.8                                                00000570
```

E	51000.	-15.70	1.8	00000580
E	50000.	-16.40	1.8	00000590
E	49000.	-17.70	1.8	00000600
E	48000.	-19.10	1.7	00000610
E	47000.	-20.20	1.7	00000620
E	46000.	-20.60	1.6	00000630
E	45000.	-20.20	1.6	00000640
E	44000.	-21.80	1.5	00000650
E	43000.	-23.80	1.5	00000660
E	42000.	-23.30	1.5	00000670
E	41000.	-26.50	1.4	00000680
E	40000.	-30.90	1.4	00000690
E	39000.	-33.10	1.4	00000700
E	38000.	-35.90	1.3	00000710
E	37000.	-36.50	1.3	00000720
E	36000.	-38.50	1.2	00000730
E	35000.	-41.50	1.2	00000740
E	34000.	-40.80	1.1	00000750
E	33000.	-42.60	1.1	00000760
E	32000.	-45.00	1.0	00000770
E	31000.	-45.50	1.0	00000780

```
E 30000.   -46.90    0.9                                                                  00000790
E 29000.   -48.60    0.9                                                                  00000800
E 28000.   -52.70    0.9                                                                  00000810
E 27000.   -54.60    0.9                                                                  00000820
E 26000.   -56.30    0.9                                                                  00000830
E 25000.   -59.20    0.9                                                                  00000840
E 24000.   -59.80    0.9                                                                  00000850
E 23000.   -62.00    0.9                                                                  00000860
E 22000.   -62.20    0.9                                                                  00000870
E 21000.   -63.50    0.9                                                                  00000880
E 20000.   -64.20    0.9                                                                  00000890
E     -1.                           END OF DATASONDE DATA                                 00000900
F    4A0326  11/22/83  1500  22000.  0.09096   IST ECC SONDE                              00000910
G   167    27.5  1000.    289.8                                                           00000920
G  1532    38.6   850.    283.5                                                           00000930
G  3121    26.0   700.    273.1                                                           00000940
G  5758    21.1   500.    259.4                                                           00000950
G  7415    17.1   400.    247.0                                                           00000960
G  9439    17.5   300.    233.2                                                           00000970
G 10661    19.0   250.    225.2                                                           00000980
G 12128    11.1   200.    221.7                                                           00000990
G 13963    10.3   150.    213.8                                                           00001000
G 16458    21.2   100.    208.0                                                           00001010
G 18607    66.3    70.    205.1                                                           00001020
G 19543    90.4    60.    208.9                                                           00001030
G 20669   114.5    50.    212.1                                                           00001040
G 22056   134.6    40.    212.9                                                           00001050
G 23858   145.1    30.    216.4                                                           00001060
G 25013   130.4    25.    216.4                                                           00001070
G 26440   110.2    20.    220.0                                                           00001080
G 28308    84.1    15.    222.5                                                           00001090
G 31008    61.0    10.    230.6                                                           00001100
H250. 0.02635 125.  0.03328 62.5 0.05307  COLUMN CONTENT UP TO STATED PR 00001110
F    4A0327  11/22/83  1720  22000.  0.08950  2ND ECC SONDE                              00001120
G   160    17.7  1000.    290.1                                                           00001130
G  1530    35.9   850.    285.4                                                           00001140
G  3126    26.7   700.    274.3                                                           00001150
G  5768    20.4   500.    259.3                                                           00001160
G  7422    17.3   400.    247.2                                                           00001170
G  9447    15.2   300.    232.5                                                           00001180
G 10670    22.7   250.    226.0                                                           00001190
G 12134     9.9   200.    221.9                                                           C9001200
G 13966     8.6   150.    213.0                                                           00001210
G 16438    19.2   100.    207.4                                                           00001220
G 18594    80.5    70.    208.4                                                           00001230
G 19539    89.7    60.    211.3                                                           00001240
G 20667   110.5    50.    211.1                                                           00001250
G 22043   127.0    40.    211.9                                                           00001260
G 23855   132.5    30.    216.6                                                           00001270
G 25023   116.6    25.    219.9                                                           00001280
G 26465    85.3    20.    220.9                                                           00001290
G 28373    66.7    15.    227.2                                                           00001300
G 31111    41.1    10.    233.8                                                           00001310
H250. 0.02589 125.  0.03190 62.5 0.05299  COLUMN CONTENT UP TO STD PRES'S00001320
/*                                                                                        00001330
// EXEC NOTIFYTS                                                                          00001340
```

PROGRAM LISTINGS

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```
C
C**********************************************************************
C
C       READ RAW OZONE (W.F.C.)     4/17/78       6/01/81       10/25/82
C       EDITION:    2
C          LANGUAGE:   FORTRAN
C          COMPUTER:   IBM 360/75, 360/          3081
C          OPERATING SYSTEM:  G. S. F. C.
C       PROGRAMMER:    EUGENE H. SHAFFER/SASC      TEWARI       E.REED
C          S. COOKE,   CHANGED NWRD=0 TEST; AFTER REC 210,       3/3/83
C                      PRINT ONLY 1 OUT OF 100; ADDED EOF
C                      STATEMENT
C                      ADDED INCR; LIST FIRST DATA; MODIFIED    4/18/83
C                      FORMATS
C
C       PURPOSE:
C          A PROGRAM TO READ AND DUMP THE RAW DIGITAL DATA THAT
C          HAS BEEN DIGITIZED AT THE COMPUTER FACILITIES OF WALLOPS
C          SPACE FLIGHT CENTER.
C
C*******************************************************************
C
C      VARIABLES:
C           NAME           TYPE  I/O  DESCRIPTION
C           ----           ----  ---  -----------
C       INTERNAL
C           DIF            R*4    O   TIME DIFFERENCE BETWEEN BLOCKS
C           ELAPSE         R*4    O   ELAPSED TIME FROM LAUNCH OF BLOCK
C           IBEGIN         I*4    I   BEGINNING RECORD NUMBER
C           ID             L*1    I   HEADER RECORD INFORMATION
C           IDAY           I*4    I   JULIAN DAY
C           IHR            I*4    I   HOUR OF THE DAY
C           INPUT          L*1    I   DATA INFORMATION
C           IMIN           I*4    I   MINUTE OF THE HOUR
C           ISEC           I*4    I   SECOND OF THE MINUTE
C           MSEC           I*4    I   MILLI-SECONDS OF THE SECOND
C           ISTOP          I*4    I   LAST RECORD NUMBER
C           IUNIT          I*4    I   TAPE UNIT NUMBER
C           LD             L*1    I   DATA INFORMATION RECORD
C           NF             I*4    I   FILE NUMBER OF TAPE
C           NX             I*4   I/O  R*4 FORM OF DATA
C           SEC            R*4    O   TOTAL NUMBER OF SECONDS
C           TAPEIN         L*1    I   INPUT TAPE
C           TIME           R*4    O   ELAPSED TIME OF EACH RECORD
C           INCR           I*4    I   INCREMENT BETWEEN PRINTED SAMPLES
C
C*********************************************************************
C
C      SUBROUTINES CALLED
C         MOUNT
C         FREAD
C         TIME1
C
C**********************************************************************
C
      LOGICAL*1 IN1(2),OUT1(2),TAPEIN(6)
```

ORIGINAL PAGE IS
OF POOR QUALITY

```fortran
      INTEGER*2 INPUT(1220),IN2,OUT2,ID(46),LD(20)
      INTEGER*4 NX(1220)
      EQUIVALENCE (IN1(1),IN2),(OUT1(1),OUT2)
      LSTN = 110
C
C    READ IN TAPE INFORMATION.
C
      READ (5,1000) TAPEIN,NF,IVER,NFLIT
      READ (5,1010) ISAMP,IBEGIN,ISTOP,INCR
      READ (5,1020) TIMES,TIME2
      WRITE (6,2030)
      WRITE (6,2040)
      WRITE (6,2030)
      WRITE(6,2050) NFLIT,TAPEIN,NF,IVER
      IF(IVER.EQ.1) WRITE(6,2051)ISAMP,IBEGIN,ISTOP,INCR
      IF(IVER.EQ.2) WRITE(6,2052)TIMES,TIME2
      WRITE (6,2030)
C
C    INITIALIZE PARAMETERS.
C
      IUNIT=10
```

```
      L=0
      IDAY=0
      IHR=0
      IMIN=0
      ISEC=0
      NCOUNT=0
      SEC=0.
C
C    MOUNT TAPE AND READ THE HEADER AND DATA INFORMATION RECORDS.
C
      CALL MOUNT (1,IUNIT,TAPEIN,NF)
      CALL FREAD (ID,IUNIT,LEN,*999,*100)
      CALL BCD5(ID,LD,40)
      DO 10 I=2,6
      IN2=ID(I)
      OUT1(2) = IN1(1)
      OUT1(1)=IN1(2)
   10 ID(I)=OUT2
      WRITE(6,2060) ID(3),ID(2),ID(6),LD(4),LD(5),(LD(I),I=7,46)
  100 CONTINUE
      CALL FREAD (LD,IUNIT,LEN,*999,*200)
      CALL BCD5(LD(4),ID(4),8)
      DO 20 I=1,20
      IN2=LD(I)
      OUT1(2)=IN1(1)
      OUT1(1) = IN1(2)
   20 LD(I)=OUT2
      WRITE(6,2065) LD(3),LD(2),(LD(I),I=8,19),(ID(J),J=4,7)
  200 CONTINUE
C
C    READ IN DATA.
C
   30 CALL FREAD (INPUT,IUNIT,LEN,*999,*200)
      L=L+1
C  THE FOLLOWING STATEMENT . IF(L .LE. N) $ CAN BE USED ON DIFFERENT
C  FLIGHTS TO SKIP BEGINNING RECORDS.
C     IF (L .LE. 24) GO TO 30
      CALL BCD5(INPUT(4),ID(1),2)
      CALL BCD5(INPUT(5),ID(2),2)
      DO 300 I=1,1220
      IN2=INPUT(I)
      OUT1(2)=IN1(1)
      OUT1(1)=IN1(2)
      INPUT(I)=OUT2
  300 NX(I)=INPUT(I)
      WRITE(6,2070) L,INPUT(2),INPUT(3),ID(1),ID(2),(INPUT(K),K=6,8)
      NX(1220)=NX(1220)+1
C
C
C    COMPUTE TIME OF CURRENT BLOCK.
C
      CALL TIME1 (1,NX(19),IDAY,IHR,IMIN,ISEC,SEC)
      CALL TIME1 (2,NX(20),IDAY,IHR,IMIN,ISEC,SEC)
      CALL TIME1 (3,NX(21),IDAY,IHR,IMIN,ISEC,SEC)
      TIME=(60.*(FLOAT(IMIN)))+(FLOAT(ISEC))+SEC
      N=0
      DO 320 I=11,1210,11
```

```
320 IF(INPUT(I).EQ.0 .OR. INPUT(I).EQ.1023) N = N +1
    WRITE(6,2020) IDAY,IHR,IMIN,ISEC,SEC,N
    IF (LSTN.GT.50 .AND. N.LE.50) GO TO 330
    IF (L .LT. IBEGIN .AND. IVER .EQ. 1) GO TO 200
    IF (L .EQ. 1 .AND. IVER .EQ. 2) GO TO 200
330 LSTN = N
    ISTART=11
    IEND=18
    IF (TIME .LT.TIMES.AND.IVER.EQ.2) GO TO 200
    IF (TIME.GT.TIME2.AND.IVER.EQ.2) GO TO 999
C
C   WRITE OUT INFORMATION FOR EACH FRAME OF DATA.
C
    WRITE(6,2010)
    DO 350 I=1,110
    CALL TIME1(1,NX(ISTART+8),IDAY1,IHR1,IMIN1,ISEC1,SEC1)
    CALL TIME1(2,NX(ISTART+9),IDAY1,IHR1,IMIN1,ISEC1,SEC1)
    TIME=(60*IMIN1+ISEC1)+SEC1
    WRITE(6,2000) IDAY,IHR,IMIN1,ISEC1,SEC1,TIME,
   +   (NX(II),II=ISTART,IEND)
    ISTART=IEND+4
```

```
      IEND=ISTART+7
  350 CONTINUE
      IF (L .GE. ISTOP .AND. IVER .EQ. 1) GO TO 500
      GO TO 200
  500 IBEGIN=IBEGIN+INCR
      ISTOP=ISTOP+INCR
      IF (IBEGIN .LT. 210) GO TO 510
      IBEGIN = IBEGIN + INCR
      ISTOP = IBEGIN
  510 NCOUNT=NCOUNT+1
      IF (NCOUNT .LT. ISAMP) GO TO 200
  999 CONTINUE
      WRITE (6,2999) L
      STOP
 1000 FORMAT (6A1,2X,I2,2X,I1,2X,I4)
 1010 FORMAT(I3,2X,I4,2X,I4,1X,I4)
 1020 FORMAT (F6.1,2X,F6.1)
 2000 FORMAT (1X,5X,4(I5,2X),F6.4,3X,F10.4,8(3X,I6))
 2010 FORMAT(' ',7X,'DAY   HOUR    MIN     SEC     SEC. ELAPSED SEC',7X,
     1'S0',7X,'S1',5X,'COMP',7X,'S4'.7X,'S5',5X,'BATT    MARKER   ',
     2 'UNCOMP')
 2050 FORMAT('0','FLIGHT NUMBER',I6,3X,'TAPE ',6A1,2X,'FILE ',I3,10X,
     1 'PRINT VERSION',I5)
 2030 FORMAT (1X,100('*'))
 2040 FORMAT(/,1X,'PROGRAM TO SAMPLE RAW OZONE TAPE (REVISED OCT.1982)'
     1/)
 2051 FORMAT('0','PRINT',I4,' SAMPLES, RECORDS',I5,' TO',I5,
     1 ' EVERY ',I5,' RECORDS')
 2052 FORMAT(1X,'PRINT FROM',F7.2,' TO',F7.1,' SECONDS')
 2060 FORMAT('0','RECORD',I6,' HAS' I6,' WORDS. TAPE',I6,2X,2A2,2X,40A2)
 2065 FORMAT('0','RECORD WORDS DT/FR FR/BF SCALE MR/FR WD/FR PRE 8 ',
     1'BFAPP INPUT OUTPT    17    18    19   RUN STREAM'/,1X,14I6,2X,
     22A2,3X,2A2/)
 2070 FORMAT(1X,I4,I6,' WORDS, BLOCK',I6,' STREAM ',2A2,' PR/AP',I6,
     1' DATA BF=',I6,' STAT ',Z2)
 2020 FORMAT('+',80X,'START',I4,' D',I3,' HR',I3,' MN',I3,'+',F6.3,
     1 ' SEC. WD1=0,F:',I4)
 2999 FORMAT('0EOF AFTER RECORD',I7)
      END
C*****************************************************************
C       SUBROUTINE TIME1      4/3/78             6/1/81
C      PROGRAMMER:    EUGENE H.SHAFFER           TEWARI
C
C       PURPOSE:
C           TO COMPUTE THE ELAPSED TIME FROM LAUNCH OF EACH
C           BLOCK OF DATA.
C
C       CALLING SEQUENCE:
C          CALL TIME1  (M,LX,IDAY,IHR,IMIN,ISEC,SEC)
C
C*****************************************************************
C
C       VARIABLES:
C            NAME           TYPE  I/O  DESCRIPTION
C            ----           ----  ---  -----------
C         INTERNAL
C            IDAY           I*4    O   DAY OF THE YEAR
```

```
C            IHR            I*4    O    HOUR OF THE DAY
C            IMIN           I*4    O    MINUTE OF THE HOUR
C            ISEC           I*4    O    SECOND OF THE MINUTE
C            LX             I*4    I    TIME WORD TO BE ANALYSED
C            M              I*4    I    INDICATOR FOR TYPE OF TIME WORD
C            SEC            R*4    O    TOTAL NUMBER OF SECONDS
C
C*********************************************************************
C
C       SUBROUTINES CALLED
C          SHFTR,SHFTL
C
C**********************************************************************
C
C
      SUBROUTINE TIME1 (M,LX,IDAY,IHR,IMIN,ISEC,SEC)
      INTEGER SHFTR,SHFTL
      IF (LX .LT. 0) LX=65535+LX
      IF (M .EQ. 2) GO TO 200
      IF (M .EQ. 3) GO TO 300
  100 CONTINUE
```

```
C
C   COMPUTE NUMBER OF MILLI-SECONDS
C
      JSEC=((SHFTR(SHFTL(LX,28),28))+(SHFTR(SHFTL(LX,20),28)*10)
     +   +(SHFTR(LX,12)*100))
      SEC=(FLOAT(JSEC))/1000.
      GO TO 500
  200 CONTINUE
C
C   COMPUTE THE NUMBER OF MINUTES AND SECONDS
C
      IMIN=((SHFTR(SHFTL(LX,17),29))*10)+(SHFTR(SHFTL(LX,20),28))
      ISEC=(SHFTR(SHFTL(LX,24),28))*10+(SHFTR(SHFTL(LX,28),28))
      GO TO 500
  300 CONTINUE
C
C   COMPUTE THE NUMBER OF DAYS AND HOURS
C
      IDAY=(SHFTR(LX,14)*100)+((SHFTR(SHFTL(LX,18),28))*10)
     +   +(SHFTR(SHFTL(LX,22),28))
      IHR=(SHFTR(SHFTL(LX,26),30)*10)+(SHFTR(SHFTL(LX,28),28))
  500 CONTINUE
      RETURN
      END
```

*** END OF MEMBER ***   257 RECORDS PROCESSED   **

```
C
C
C***********************************************************************
C
C     RADAR COPY1 PROGRAM   4/07/83
C
C         LANGUAGE:            FORTRAN
C         COMPUTER:            IBM 3081
C         OPERATING SYSTEM:    G.S.F.C.
C         PROGRAMMER:          SHIRLEY COOKE
C
C         PURPOSE:
C              THIS PROGRAM COPIES VARIOUS RADAR OUTPUT RECORDS FROM
C              ORIGINAL RADAR OUTPUT TAPE. (ORIGINAL OUTPUT TAPE
C              NEEDS MODIFYING; THIS PROGRAM COPIES THOSE RECORDS
C              WHICH DO NOT REQUIRE ANY CHANGES.)
C***********************************************************************
C
C                              VARIABLE LIST
C
C                    NAME       TYPE   I/O   DESCRIPTION
C                    ----       ----   ---   -----------
C                    IUNIT      I*4     I    INPUT TAPE UNIT NUMBER
C                    IUNIT2     I*4     I    OUTPUT TAPE UNIT NUMBER
C                    NF         I*4     I    INPUT TAPE FILE NUMBER
C                    NF2        I*4     I    OUTPUT TAPE FILE NUMBER
C                    NFILE      I*4     I    NUMBER OF FILES ON INPUT TAPE
C                    R(13)      R*4    I/O   RADAR DATA ARRAY
C                    STIME      R*4     I    TIME CORRECTION
C                    TAPEIN(6)  L*1     I    INPUT TAPE NAME
C                    TAPOUT(6)  L*1     I    OUTPUT TAPE NAME
C                    PED(13)    R*4     I    PEDIGREE ARRAY NAME
C
C***********************************************************************
C         SUBROUTINES CALLED
C            MOUNT
C            FREAD
C            RPDATO
C            FWRITE
C
C***********************************************************************
      INTEGER ERROR(50)
      LOGICAL*1 TAPOUT(6),TAPEIN(6)
      LOGICAL*4 SITE(4)
      EQUIVALENCE (PED(10),SITE(1))
      DIMENSION R(13),IYMD(3),IDATE(3),PED(13)
C
C  READ IN INPUT AND OUTPUT TAPE INFO.
C
      READ (5,1020) TAPEIN,IUNIT,NF,NFILE,STIME
      WRITE (6,2020) TAPEIN,IUNIT,NF
      READ (5,1000) TAPOUT,IUNIT2,NF2
      WRITE (6,1030) TAPOUT,IUNIT2,NF2
C
C  MOUNT TAPES, AND INITIALIZE VARIABLES.
      CALL MOUNT(1,IUNIT,TAPEIN,NF)
```

```
      CALL MOUNT(2,IUNIT2,TAPOUT,NF2)
      KNTREC = 0
      KNTERR = 0
      LINES = 0
C
C  READ PEDIGREE FROM INPUT TAPE AND MAKE MODIFICATIONS TO
C  CURRENT DATE.
      CALL FREAD(PED,IUNIT,LEN,&122,&124)
      CALL RPDATO(1,IYMD)
      PED(9) = IYMD(2)*10000 + IYMD(3)*100 + IYMD(1)
C
C  MAKE PRINTOUT OF PEDIGREE AND COPY IT ONTO NEW RADAR OUTPUT TAPE.
      WRITE(6,2065) (PED(KZ),KZ=1,9),SITE
      CALL FWRITE(PED,IUNIT2,LEN)
      WRITE (6,2035) NFILE, STIME
C  PRINT HEADINGS.
      WRITE (6,2060)
      WRITE (6,2045)
      WRITE (6,2050)
C  READ INPUT TAPE DATA AND MAKE PRINTOUT OF IT. COPY DATA ONTO
C  OUTPUT TAPE.
```

```
 100 CONTINUE
     CALL FREAD(R,IUNIT,LEN,&150,&130)
     CALL FWRITE(R,IUNIT2,LEN)
     KNTREC = KNTREC + 1
     LINES = LINES + 1
     IF (LINES .LE. 78) GO TO 120
     LINES = 1
     WRITE (6,2055)
     WRITE (6,2045)
     WRITE (6,2050)
 120 WRITE (6,2010) R
     GO TO 100
 122 WRITE (6,2122)
     STOP
 124 WRITE (6,2124)
     STOP
 130 CONTINUE
     KNTERR = KNTERR + 1
     WRITE (6,2040)
     ERROR(KNTERR) = KNTREC + 1
     GO TO 100
 150 CONTINUE
     WRITE (6,2030) KNTREC,KNTERR
     IF (KNTERR .LE. 0) GO TO 200
     WRITE (6,2070)
     DO 160 I=1,KNTERR
        WRITE (6,2075) ERROR(I)
 160    CONTINUE
 200 WRITE (6,2080)
1000 FORMAT(1X,6A1,6X,I2,3X,I2)
1010 FORMAT(12X,F10.4,2X,F10.0,A1,1X,2(F10.4,A1,1X),
   1  3(F10.0,A1,1X),12X,F10.0,A1,1X,24X,
   2  4(F10.0,A1,1X),12X,F10.4,A1,1X)
1020 FORMAT(1X,6A1,6X,I2,3X,I2,3X,I2,4X,F7.2,3X,I3,3X,I2,1X,I2,1X,I2)
1030 FORMAT(1X,2X,'TAPEOUT: ',6A1,5X,'UNIT:',I3,5X,'FILE:',I3)
1035 FORMAT(1X,F4.0,2X,I2,1X,I2,1X,I2,2X,F8.1,2X,F7.3,2X,F8.3,2X,4A4)
2010 FORMAT(1X,F10.4,F10.1,2F10.4,8F10.1,F10.4)
2020 FORMAT('1',2X,'TAPEIN:  ',6A1,5X,'UNIT:',I3,5X,'FILE:',I3)
2030 FORMAT(/,1X,5X,'NUMBER OF RECORDS WRITTEN: ',I5,/,
   1  1X,5X,'NUMBER OF ERROR RECORDS: ',I5,//)
2035 FORMAT(1X,5X,'NUMBER OF FILES TO PROCESS:',I3,/,
   1  1X,5X,'TIME CORRECTION:',F9.2,///)
2040 FORMAT(10X,'RADAR 2040: TAPE RECORD ERROR, PROCESSING CONTINUING')
2045 FORMAT(1X,'  SECONDS ',4X,' SLANT',3X,'AZIMUTH ELEVATION',
   1  6X,'HOR ',6X,'N-S ',6X,'E-W ',2X,'ALTITUDE',7X,'HOR',7X,
   2  'E-W',7X,'N-S',6X,'VERT',3X,'HOR VEL ')
2050 FORMAT(1X,' AFTER HOUR  ',2X,'RANGE   DEGREES   DEGREES',5X,
   1  'RANGE ',4X,'RANGE ',4X,'RANGE  OBL.SPH.',7X,'VEL',7X,'VEL',
   2  7X,'VEL',6X,'VEL ',3X,'AZIMUTH')
2055 FORMAT('1')
2060 FORMAT(40X,'DISTANCE IN METERS, VELOCITIES IN METERS/SECOND',/)
2065 FORMAT(//,1X,11X,'FLT',5X,'VEH/LOC',5X,'FLT DATE',5X,'GMT TIME',
   1  5X,'LAT',6X,'LONG',5X,'TAPE RCD',5X,'RUN DATE',5X,
   2  'LAUNCH LOCATION',//,
   3  1X,1X,F5.0,5X,F4.0,5X,F4.0,8X,F7.0,5X,F8.1,3X,F7.3,2X,F8.3,
   4  4X,F7.0,6X,F7.0,5X,4A4,/)
2070 FORMAT(1X,5X,'THE FOLLOWING ARE RECORD NUMBERS OF RECORDS WITH INP
```

```
     -UT ERRORS;',/)                                                    00001950
2075 FORMAT(1X,30X,I5)                                                  00001960
2080 FORMAT(//,1X,120('*'))                                             00001970
2122 FORMAT (1X,' PEDIGREE NOT FOUND IN FIRST RECORD.')                 00001972
2124 FORMAT (1X,' ERROR IN READING PEDIGREE RECORD.')                   00001974
     STOP                                                               00001980
     END                                                                00001990

*** END OF MEMBER ***    141 RECORDS PROCESSED   ***************************************************************************
```

```
C      RADAR.CNTL(LISTRAD)
C
C  S. COOKE                OCT., 1983
C
C  LISTRAD PRINTS OUT THE WORDS ON THE INPUT RADAR TAPE (USED
C FOR ALL PASS1 TAPES FOR FLIGHTS AFTER 315, EXCLUSIVE)
C
      LOGICAL*1 TAPEIN(6)
      REAL*8 RADAR(4)
C
      IREC = 0
C READ AND PRINT OUT HEADING INFORMATION.
      READ(5,1000) IFLT,DATE,TAPEIN,NFILE
 1000 FORMAT(1X,I3,2X,F7.0,2X,6A1,2X,I2)
      WRITE(6,2000) IFLT,DATE,TAPEIN,NFILE
 2000 FORMAT('1 FLIGHT NO. ',I3,5X,'DATE LAUNCHED (MMDDYY.): ',
     X F7.0,5X,'INPUT TAPE NO.: ',6A1,5X,'FILE NO.: ',I2,//)
      WRITE(6,2010)
 2010 FORMAT(1X,'SEC ELAPSED',4X,'HEIGHT',4X,'LATITUDE',2X,
     X 'LONGITUDE',/)
C
C MOUNT INPUT TAPE.
      CALL MOUNT(1,10,TAPEIN,NFILE)
C
C READ AND PRINT OUT EACH RECORD.
      DO 50 N = 1,3000
        CALL FREAD(RADAR(1),10,LEN,*300,*400)
        WRITE(6,2050) (RADAR(L),L=1,4)
 2050 FORMAT(2X,F8.2,4X,F9.2,2X,F9.4,2X,F9.4)
        IREC = IREC + 1
   50   CONTINUE
      GO TO 999
  300 WRITE(6,2300) IREC
 2300 FORMAT(1X,'END OF FILE AFTER RECORD ',I6)
      GO TO 999
  400 WRITE(6,2400) IREC
 2400 FORMAT(1X,'INPUT TAPE ERROR AFTER RECORD ',I6)
  999 STOP
      END
```

*** END OF MEMBER ***   39 RECORDS PROCESSED   **

```
C
C
C**********************************************************************
C
C    RADAR PROGRAM  9/ /78           REVSD:      6/13/80   02/14/83
C       EDITION:    1
C          LANGUAGE:   FORTRAN
C          COMPUTER:   IBM 360/75, 360/91        3081
C          OPERATING SYSTEM:  G. S. F. C.
C       PROGRAMMER:    EUGENE H. SHAFFER/SASC   TEWARI      E.REED
C                                                           S.COOKE
C
C       PURPOSE:
C          A PROGRAM TO READ THE DIGITIZED RADAR DATA TAPE AND
C          TO RE-FORMAT THE DATA AND WRITE THE DATA TO A SCRATCH
C          TAPE TO BE USED LATER BY THE "MERGE" PROGRAM.
C
C*******************************************************************
C
C      VARIABLES:
C           NAME           TYPE  I/O  DESCRIPTION
C           ----           ----  ---  -----------
C       INTERNAL
C           C              R*4    I   CONVERSION FACTOR
C           IUNIT          I*4    I   INPUT TAPE UNIT NUMBER
C           IUNIT2         I*4    I   OUTPUT TAPE UNIT NUMBER
C           NF             I*4    I   INPUT TAPE FILE NUMBER
C           NF2            I*4    I   OUTPUT TAPE FILE NUMBER
C           NFILE          I*4    I   NUMBER OF FILES ON INPUT TAPE
C           R(13)          R*4   I/O  PEDIGREE ARRAY/RADAR DATA ARRAY
C           S1-S12         R*4    I   PARITY INDICATOR
C           STIME          R*4    I   TIME CORRECTION
C           TAPEIN(6)      L*1    I   INPUT TAPE NAME
C           TAPOUT(6)      L*1    I   OUTPUT TAPE NAME
C           IDATE(3)       I*4   I/O  DATE TAPE REC'D
C           LMO            I*4   I/O  LAUNCH MONTH
C           LDY            I*4   I/O LAUNCH DAY
C           LYR            I*4   I/O LAUNCH YEAR
C           SITE(16)       L*1   I/O  LAUNCH SITE NAME
C********************************************************************
C
C      SUBROUTINES CALLED
C         MOUNT
C         FREAD
C         RPDATO
C         FWRITE
C
C**********************************************************************
C
      LOGICAL*1 TAPOUT(6),MINUS/'-'/,S1,S2,S3,S4,S5,S6,S7,S8,S9,S10,
     * S11,S12,TAPEIN(6),DATE(10),OK/.TRUE./
      LOGICAL*4 SITE(4)
C
C   READ IN INPUT AND OUTPUT TAPE INFO AND STARTING TIME INFO.
C
      EQUIVALENCE (R(10),SITE(1))
```

```
      DIMENSION R(13),IYMD(3),IDATE(3)
      READ (5,1020) TAPEIN,IUNIT,NF,NFILE,STIME,IFLT,IDATE
      WRITE (6,2020) TAPEIN,IUNIT,NF
      READ(5,1000) TAPOUT,IUNIT2,NF2
      WRITE (6,1030) TAPOUT,IUNIT2,NF2
      CALL RPDATO(1,IYMD)
      R(1) = -100
      R(2) = IFLT
      R(8) = IDATE(1)*10000 + IDATE(2)*100 + IDATE(3)
      R(9) = IYMD(2)*10000 + IYMD(3)*100 + IYMD(1)
      READ(5,1035) R(3),LMO,LDY,LYR,(R(K),K=5,7),SITE
      R(4) = LMO*10000 + LDY*100 + LYR
      WRITE(6,2065) (R(KZ),KZ=1,13)
      WRITE (6,2035) NFILE,STIME
      WRITE(6,2060)
      WRITE(6,2045)
      WRITE(6,2050)
      CALL MOUNT (1,IUNIT,TAPEIN,NF)
      CALL MOUNT (2,IUNIT2,TAPOUT,NF2)
      CALL FWRITE(R,IUNIT2,LEN)
C  REWIND INPUT UNIT TO AVOID A SECOND OPEN ATTEMPT ON SAME UNIT
```

```
C  (MOUNT ALREADY OPENED THE UNIT AND FORTRAN READ WILL TRY AGAIN.)
      CALL REWIND (IUNIT)
      C= .3048
      I=1
      LINES=8
      SAME=0.
      KNTREC = 0
      KNTERR = 0
C
C   READ IN RADAR INFO FROM INPUT TAPE.
C
  100 CONTINUE
      READ(10,1010,END=110,ERR=115)R(1),R(2),S1,R(3),S2,R(4),S3,
     * R(5),S4,R(6),S5,R(7),S6,R(8),S7,R(9),S8,R(10),S9,R(11),
     * S10,R(12),S11,R(13),S12
      IF(OK) GO TO 102
      OK=.TRUE.
      GO TO 100
  102 R(1)=R(1)+STIME
      IF(R(1).EQ.SAME)  GO TO 100
C
C   CHECK PARITY
C
      IF(S1.EQ.MINUS)R(2)=-1*R(2)
      IF(S2.EQ.MINUS)R(3)=-1*R(3)
      IF(S3.EQ.MINUS)R(4)=-1*R(4)
      IF(S4.EQ.MINUS)R(5)=-1*R(5)
      IF(S5.EQ.MINUS)R(6)=-1*R(6)
      IF(S6.EQ.MINUS)R(7)=-1*R(7)
      IF(S7.EQ.MINUS)R(8)=-1*R(8)
      IF(S8.EQ.MINUS)R(9)=-1*R(9)
      IF(S9.EQ.MINUS)R(10)=-1*R(10)
      IF(S10.EQ.MINUS)R(11)=-1*R(11)
      IF(S11.EQ.MINUS)R(12)=-1*R(12)
      IF(S12.EQ.MINUS)R(13)=-1*R(13)
      R(2)=C*R(2)
      DO 105 J=1,8
      R(J+4)=C*R(J+4)
  105 CONTINUE
C
C   PRINT OUT THE REFORMATTED RADAR DATA AND WRITE IT ON THE OUTPUT
C   TAPE.
C
      CALL FWRITE (R,IUNIT2,LEN)
      KNTREC=KNTREC+1
      LINES=LINES+1
      IF(LINES.LE.78) GO TO 108
      LINES=1
      WRITE(6,2055)
      WRITE(6,2045)
      WRITE(6,2050)
  108 WRITE (6,2010)R
      SAME=R(1)
      GO TO 100
  110 CONTINUE
      WRITE(6,2000)I
      IF(NFILE.EQ.I)GO TO 120
```

```
      NUFIL=NF+I
      REWIND IUNIT
      CALL POSN(1,IUNIT,NUFIL)
      CALL REWIND (IUNIT)
      I=I+1
      GO TO 100
  115 CONTINUE
      KNTERR=KNTERR+1
      WRITE(6,2040)
      OK=.FALSE.
      GO TO 100
  120 CONTINUE
      WRITE (6,2030) KNTREC,KNTERR
 1000 FORMAT(1X,6A1,6X,I2,3X,I2)
 1010 FORMAT(12X,F10.4,2X,F10.0,A1,1X,2(F10.4,A1,1X),
     * 3(F10.0,A1,1X),12X,F10.0,A1,1X,24X,
     * 4(F10.0,A1,1X),12X,F10.4,A1,1X)
 1020 FORMAT (1X,6A1,6X,I2,3X,I2,3X,I2,4X,F7.2,3X,I3,3X,I2,1X,I2,1X,I2)
 1030 FORMAT(1X,2X,'TAPEOUT: ',6A1,5X,'UNIT:',I3,5X,'FILE:',I3)
 1035 FORMAT (1X,F4.0,2X,I2,1X,I2,1X,I2,2X,F8.1,2X,F7.3,2X,F8.3,2X,4A4)
 2000 FORMAT(10X,'RADAR 2000: END OF FILE NO.',I4)
```

26JUL84 08.52.34 - VOL=SACC10, DSN=Z8SAC.RADAR.CNTL   MEMBER=RADAR

```
2010 FORMAT (1X,F10.4,F10.1,2F10.4,8F10.1,F10.4)
2020 FORMAT ('1',2X,'TAPEIN:  ',6A1,5X,'UNIT:',I3,5X,'FILE:',I3)
2030 FORMAT (/,1X,5X,'NUMBER OF RECORDS WRITTEN: ',I4,/,
    1 1X,5X,'NUMBER OF ERROR RECORDS: ',I4,//,
    2 1X,120('*'),/)
2035 FORMAT (1X,5X,'NUMBER OF FILES TO PROCESS:',I3,/,
    1        1X,5X,'TIME CORRECTION:',F9.2,///)
2040 FORMAT(10X,'RADAR 2040: TAPE RECORD ERROR,PROCESSING CONTINUING')
2045 FORMAT(1X,'  SECONDS ',4X,' SLANT',3X,'AZIMUTH ELEVATION',
    1 6X,'HOR ',6X,'N-S ',6X,'E-W ',2X,'ALTITUDE',7X,'HOR',7X,
    2 'E-W',7X,'N-S',6X,'VERT',3X,'HOR VEL ')
2050 FORMAT(1X,' AFTER HOUR  ',2X,'RANGE   DEGREES   DEGREES',5X,
    1 'RANGE ',4X,'RANGE ',4X,'RANGE  OBL.SPH.',7X,'VEL',7X,'VEL',
    2 7X,'VEL',6X,'VEL ',3X,'AZIMUTH')
2055 FORMAT('1')
2060 FORMAT(40X,'DISTANCE IN METERS, VELOCITIES IN METERS/SECOND'/)
2065 FORMAT (//,1X,11X,'FLT',5X,'VEH/LOC',5X,'FLT DATE',5X,'GMT TIME',
    1 5X,'LAT',6X,'LONG',5X,'TAPE RCD',5X,'RUN DATE',5X,
    2 'LAUNCH LOCATION',//,
    3 1X,1X,F5.0,5X,F4.0,5X,F4.0,8X,F7.0,5X,F8.1,3X,F7.3,2X,F8.3,
    4 4X,F7.0,6X,F7.0,5X,4A4,/)
     STOP
     END
```

*** END OF MEMBER ***   178 RECORDS PROCESSED   ***

```
C
      SUBROUTINE BLOCK(ICODE)
C
C  BLOCK READS THE OZONE TM TAPE AND CONVERTS ALL TIME WORDS
C  *** IN THIS VERSION OF BLOCK, PROCESSING MAY BE STOPPED  ***
C  *** AFTER REACHING A SPECIFIC RECORD.                    ***
C
C  EUGENE SHAFFER(SASC)      3/78     KRISHNA TEWARI     6/81
C  E.REED/G.BATLUCK          10/82
C
C  ICODE =0 NO PROBLEM
C         1 END OF FILE
C
      COMMON/LABEL1/IREC,DELTAT,MPEAK,LPEAK,LIMIT
      COMMON /LABEL3/DATA(1210),INPUT(1220)
      COMMON/LABEL5/OUTX(20)
C
      LOGICAL*1 IN1(2),OUT1(2)
      INTEGER*4 SHFTR,SHFTL,DATA
      INTEGER*2 INPUT,IN2,OUT2
      REAL*4 RATA(1210)
      EQUIVALENCE (IN1(1),IN2),(OUT1(1),OUT2),(RATA(1),DATA(1))
      DATA NREC/0/
C
      ICODE=0
C
C   READ IN RAW SIGNAL DATA.
C
      DO 20 I=1,IREC
      NREC=NREC+1
      CALL FREAD(INPUT,10,LEN,&110,&10)
      IF(NREC.GE.IREC) GO TO 30
      GO TO 20
   10 WRITE(6,2010) NREC
   20 CONTINUE
   30 J=0
C THE FOLLOWING STATEMENT (NREC.GT.XXX) IS TO BE USED TO STOP
C   PROCESSING CERTAIN FLIGHTS AFTER REACHING A SPECIFIC RECORD.
      IF (NREC.GT.136) GO TO 110
C CONVERT TO IBM FORMAT
      DO 80 NZ=11,1220
      J=J+1
      IN2=INPUT(NZ)
      OUT1(2)=IN1(1)
      OUT1(1)=IN1(2)
      INPUT(NZ)=OUT2
   80 DATA(J)=INPUT(NZ)
C  CONVERT TIME WORDS TO (9) DDDHH,(10) MMSS, (11) SECONDS (REAL)
      DO 90 J=9,1208,11
C MILLISECONDS
      LX=DATA(J)
      IF(LX.LT.0) LX=LX+65535
      JSEC=((SHFTR(SHFTL(LX,28),28))+(SHFTR(SHFTL(LX,20),28)*10)
     +   +(SHFTR(LX,12)*100))
      SEC=(FLOAT(JSEC))/1000.
C  MINUTE AND SECOND
```

```
      LX=DATA(J+1)
      IF (LX .LT. 0) LX = LX + 65535
      IMIN=((SHFTR(SHFTL(LX,17),29))*10)+(SHFTR(SHFTL(LX,20),28))
C THE FOLLOWING LINE (RE: NREC 1900 OR 1901) IS FOR FLT 295 ONLY.
C     IF (NREC.EQ.1900 .OR. NREC.EQ.1901) IMIN = 8
      ISEC=(SHFTR(SHFTL(LX,24),28))*10+(SHFTR(SHFTL(LX,28),28))
      DATA(J+1) = 100*IMIN+ISEC
C   DAY AND HOUR
      LX=DATA(J+2)
      IF (LX .LT. 0) LX = LX + 65535
      IDAY=(SHFTR(LX,14)*100)+((SHFTR(SHFTL(LX,18),28))*10)
     +   +(SHFTR(SHFTL(LX,22),28))
      IHR=(SHFTR(SHFTL(LX,26),30)*10)+(SHFTR(SHFTL(LX,28),28))
      DATA(J) = 100*IDAY+IHR
      RATA(J+2) =SEC
   90 CONTINUE
      GO TO 999
  110 ICODE=1
      NREC=NREC-1
      WRITE(6,2020)NREC
 2010 FORMAT(1X,'BLOCK 2010: READ ERROR IN RECORD' ,I6)
```

```
26JUL84 08.52.34 - VOL=SACC09, DSN=Z8SAC.EDIT.CNTL                                    MEMBER="' OCK1

2020 FORMAT(1X,'BLOCK 2020: END OF FILE AFTER RECORD',I6)                    00000760
 999 RETURN                                                                  00000770
     END                                                                     00000780

*** END OF MEMBER ***     80 RECORDS PROCESSED   ************************************************************************
```

```
C  EDIT OZONE PROGRAM
C
C  A PROGRAM TO READ THE DIGITIZED OZONE TAPE FROM WALLOPS FLIGHT
C  FACILITY.  EDIT THE DATA AND REFORMAT THE DATA ON AN OUTPUT TAPE.
C
C  EUGENE SHAFFER(SASC)         3/78
C  KRISHNA TEWARI               6/81     10 BIT DATA
C  E.REED/BATLUCK               12/82
C  S.COOKE                      02/83     ADDED CMPAVE & PEDIGREE
C                               11/83     CHANGED FREAD FOR READING ID
C                                         AND INPU ARRAYS
C  B. ALLEN                     04/20/83  MODIFICATION TO CYCLE
C
C  VARIABLES:
C     NAMES        TYPE   I/O   DESCRIPTION
C
C COMMON/LABEL1/
C     DELTAT          R*4     I     AVERAGE TIME OF FILTER WHEEL CYCLE
C     IREC            I*4     I     NUMBER OF FIRST RECORD TO BE PROCESSE
C     MPEAK           I*4     I     HIGH MODE OF MARKER CHANNEL
C     LPEAK           I*4     I     LOW MODE OF MARKER CHANNEL
C     LIMIT           I*4     I     ACCEPTABLE RANGE OF MARKER CHANNEL
C COMMON/LABEL3/
C     DATA            I*4     I     INPUT DATA
C     INPUT           I*2     I     INPUT DATA
C COMMON/LABEL5/
C     OUTX            R*4     0     OUTPUT ARRAY
C*************************************************************
C
C
C     SUBPROGRAMS CALLED
C          MOUNT,FREAD,FWRITE,CONVRT,CYCLE,SWITCH,BCD5,CMOVE,RPDATO
C
C
C*************************************************************
      COMMON/LABEL1/IREC,DELTAT,MPEAK,LPEAK,LIMIT
      COMMON /LABEL3/DATA(1210),INPUT(1220)
      COMMON /LABEL5/OUTX(20)
      COMMON/CAL/B1,V1,B2,V2,T(3),VT(3)
C
      LOGICAL*1 TAPEIN(6),TAPOUT(6),ID(92),LD(40),IOIN(6),IOOUT(6)
      LOGICAL*1 INPU(92)
      INTEGER*2 INPUT,ID2(46),LD2(20),SWITCH
      INTEGER*4 DATA,TSTBUF(610)
      DIMENSION IYMD(3),IDATE(3)
      EQUIVALENCE(ID(1),ID2(1)),(LD(1),LD2(1)),(INPU(1),INPUT(1))
C
      NOUT=0
      OUTX(1) = 0.
      CALL CMOVE(OUTX(1),OUTX(2),76)
      TMFR=0.01125
C
C  READ IN AND WRITE OUT INPUT DATA.
C
      WRITE (6,2000)
      READ (5,1000) TAPEIN,IOIN,IUNIT1,NF1
```

```
      READ (5,1000) TAPOUT,IOOUT,IUNIT2,NF2,LEN2
      WRITE (6,2010) TAPEIN,IOIN,IUNIT1,NF1
      WRITE (6,2010) TAPOUT,IOOUT,IUNIT2,NF2,LEN2
      WRITE (6,2020)
      READ (5,1010) DELTAT,IREC,MPEAK,LPEAK,LIMIT
      IF(IREC.LT.1) IREC=1
      WRITE (6,2030)DELTAT,IREC,MPEAK,LPEAK,LIMIT
C
C    MOUNT INPUT AND OUTPUT TAPES.
C
      CALL MOUNT (1,IUNIT1,TAPEIN,NF1)
      CALL MOUNT (2,IUNIT2,TAPOUT,NF2)
C
C    READ IN HEADER RECORD AND DATA DESCRIPTION RECORD.
C
      LEN = 0
      CALL FREAD (TSTBUF(1),10,LEN,&900,&910)
      CALL CMOVE(TSTBUF(1),ID(1),92)
      N=SWITCH(ID2(2))
      NT=SWITCH(ID2(6))
      CALL BCD5(ID,INPU,92)
```

```
      WRITE(6,2012)N,NT,INPUT(4),INPUT(5),(INPUT(I),I=7,46)
   50 CONTINUE
      LEN = 0
      CALL FREAD (TSTBUF(1),10,LEN,&900,&920)
      CALL CMOVE(TSTBUF(1),LD(1),40)
      NFR = SWITCH(LD2(9))
      N=SWITCH(LD2(16))
      WRITE(6,2014)NFR,N
      CALL CONVRT(I,I,I,I,1)
C  COMPUTE AND PRINT PEDIGREE.
      OUTX(1)=-200.
      CALL RPDATO(1,IYMD)
      OUTX(5)=IYMD(2)*10000 + IYMD(3)*100 + IYMD(1)
      OUTX(6)=B1
      OUTX(7)=V1
      OUTX(8)=B2
      OUTX(9)=V2
      OUTX(10)=T(1)
      OUTX(11)=VT(1)
      OUTX(12)=T(2)
      OUTX(13)=VT(2)
      OUTX(14)=T(3)
      OUTX(15)=VT(3)
      READ (5,1020)OUTX(2),OUTX(3),IDATE
      OUTX(4)=IDATE(1)*10000 + IDATE(2)*100 + IDATE(3)
      DO 20 I=16,20
         OUTX(I)=0.0
   20    CONTINUE
      WRITE (6,2070)
      WRITE (6,2080)(OUTX(KL),KL=1,15)
      CALL FWRITE(OUTX,IUNIT2,LEN2)
      WRITE(6,2050)
      LINE=1
C
C   READ IN RAW SIGNAL DATA.
C
  200 CALL CYCLE(NCODE,NERR)
      IF(NCODE.NE.0) GO TO 990
C
C   WRITE THE OUTPUT ARRAY AND WRITE OUT DATA ON TAPE AND PRINTER.
C
      CALL FWRITE(OUTX,15,LEN2)
      NOUT=NOUT+1
      IXPECT=OUTX(15)/TMFR
      IF(MOD(LINE,70).EQ.0) WRITE(6,2050)
      WRITE(6,2060)OUTX,IXPECT
      LINE=LINE+1
      GO TO 200
C END OF FILE
  900 WRITE(6,2900)
      GO TO 990
C ERROR IN HEADER RECORD
  910 WRITE(6,2910)
      GO TO 50
C ERROR IN DATA DESCRIPTION RECORD
  920 WRITE(6,2920)
      GO TO 200
```

```
C PROGRAM TERMINATION
  990 WRITE(6,2990)NOUT,NERR
      STOP
 1000 FORMAT (6A1,2X,6A1,2X,I2,2X,I2,2X,I3)
 1010 FORMAT (F6.3,4(2X,I3))
 1020 FORMAT (F5.1,2X,F4.0,1X,3(1X,I2))
 2000 FORMAT (1X,120('*'),//,33X,'PROGRAM:   EDIT -- REVISED   ',
     1   'FEBRUARY 22, 1983      ',//,1X,120('*'),//,1X,29X,'TAPE INFO:',
     2   '     NAME     I/O     UNIT     FILE#     RECORD LEN.',/)
 2010 FORMAT (1X,43X,6A1,3X,6A1,4X,I2,7X,I2,11X,I3)
 2012 FORMAT('0',' HDR1:',I6,' WORDS. TAPE NUMBER',I4,
     1 ' STREAM',1X,2A2,2X,40A2)
 2014 FORMAT('0',' HDR2:',I6,' FRAMES PER RECORD',I8,
     X ' WORDS PER RECORD')
 2020 FORMAT (/,1X,120('*'),//,1X,29X,'INPUT DATA:     DELTAT     ',
     1   'RECORD     HPEAK     LPEAK     RANGE',/)
 2030 FORMAT (1X,44X,F6.3,6X,I3,8X,I3,7X,I3,7X,I3)
 2040 FORMAT (/,1X,120('*'),//)
 2050 FORMAT('1','  T1(SEC)    T2(SEC)   T4(SEC)   T5(SEC)  AVG1',
     1 '  AVG2  AVG4  AVG5 MRKR BASE CMP1 CMP2 CMP4 CMP5 DELPK',
     2 ' DELAV CMAV BATV TR C SM EX',/)
```

```
2060 FORMAT(1X,4F10.3,4F6.1,6F5.0,2F6.3,1F5.0,F5.2,F5.1,F4.0,I3)
2070 FORMAT(///,1X,55X,'BATTERY CALIBRATION',21X,
    1 'TEMPERATURE CALIBRATION',//,
    2 1X,7X,'FLT/LG',2X,'PAYLOAD',3X,'TAPE RCD',3X,'RUN DATE',4X,
    3 2('VOLTS',3X,'TM CT',3X),2('DEG C.',2X,'TM VOLTS',2X),'DEG C.',
    4 2X,'TM VOLTS',/,
    5 1X,47X,'(UPPER)',9X,'(LOWER)',9X,'(LOWER)',29X,'(UPPER)',/)
2080 FORMAT(1X,1X,F5.0,2X,F5.1,4X,F4.0,2(4X,F7.0),5X,
    1 2(F5.1,2X,F6.2,3X),2(F5.1,4X,F6.2,3X),F5.1,4X,F6.2,//)
2900 FORMAT(1X,'MAIN 2900: EOF FOR HEADER OR DATA DESC RECORD')
2910 FORMAT(1X,'MAIN 2910: ERROR IN READING HEADER RECORD')
2920 FORMAT(1X,'MAIN 2920: ERROR IN READING DATA DESCRIPTION RECORD')
2990 FORMAT(1X,'MAIN 2990:',I8, ' RECORDS WRITTEN.',I8,
    X ' AVERAGES SET TO -99.',/,11X,' PROGRAM END')
     END
C ********************************************************************
C
     FUNCTION SWITCH(X)
C
C  REED/BATLUCK   NOV. 1982
C
C  SWITCH INTERCHANGES THE BYTES OF THE I*2 WORDS TO MAKE THEM
C  COMPATIBLE WITH IBM STRUCTURE.
     INTEGER*2 X,T,SWITCH,Z
     LOGICAL*1 A(2),B(2)
     EQUIVALENCE(Z,A(1)),(T,B(1))
     Z=X
     B(1) = A(2)
     B(2) = A(1)
     SWITCH = T
     RETURN
     END
C ********************************************************************
C
     SUBROUTINE CONVRT(BATTV,TEMPC,AVG6,HAVG7,MODE)
C
C  CONVRT READS IN CALIBRATION DATA FOR BATTERY VOLTAGE AND PAYLOAD
C  TEMPERATURE, AND APPLIES IT TO AVERAGE VALUES OF WORD 6 AND MARKER.
C
C  OCT. 22, 1982  EDITH REED  G. BATLUCK
C
C ARGUMENTS
C    BATTV     VOLTAGE FROM PAYLOAD BATTERY,NOMINAL 6V
C    TEMPC     PAYLOAD TEMPERATURE,DEGREES CELSIUS
C    AVG6     AVERAGE VALUE OF WORD 6 DURING ONE FILTER CYCLE
C   VOLT7
C    HAVG7     AVERAGE VALUE OF MARKER PULSE (WORD 7)
C    MODE=1   READ IN CALIBRATION DATA
C        =2   CALCULATE BATTV AND TEMPC
C
     DIMENSION TMPCAL(71),ADJ(3),TMP(3)
     COMMON/CAL/B1,V1,B2,V2,T(3),VT(3)

     DATA TMPCAL/9.961,9.857,9.748,9.636,9.519,9.399,9.280,9.156,
    1 9.029,8.898,8.764,8.633,8.497,8.358,8.216,8.071,7.931,7.787,
    2 7.640,7.491,7.341,7.192,7.042,6.892,6.742,6.594,6.445,6.296,
    3 6.147,6.000,5.853,5.709,5.564,5.422,5.281,5.143,5.005,4.870,
```

```
     4 4.736,4.603,4.476,4.361,4.226,4.104,3.984,3.867,3.753,3.642,
     5 3.532,3.426,3.321,3.220,3.121,3.025,2.930,2.838,2.750,2.654,
     6 2.580,2.499,2.419,2.343,2.269,2.197,2.126,2.059,1.992,1.929,
     7 1.866,1.807,1.747/
C
      IF(MODE.EQ.2) GO TO 200
C  READ IN CALIBRATION VALUES      BATTV = C1 +C2*WORD 6
      READ(5,1000) B1,V1,B2,V2
      C2=(B1-B2)/(V1-V2)
      C1=B1-C2*V1
      WRITE(6,2000)C1,C2
C  READ IN TEMPERATURE CALIBRATION VALUES
      READ(5,1010)(T(I),VT(I),I=1,3)
C  CALCULATE ADJUSTMENT FACTORS
      DO 40 I=1,3
      IT=T(I)+21.05
      DO 20 J=1,71
      JT=J
      IF(JT.GE.IT) GO TO 30
   20 CONTINUE
   30 ADJ(I)=VT(I)/TMPCAL(JT)
```

```
   40 CONTINUE
C  ADJUST TEMPERATURE CALIBRATION CURVE AND CONVERT TO COUNTS
      DO 80 I=1,2
      IA=T(I)+20.05+I
      IB=T(I+1) +21.05
      C=((ADJ(I+1)-ADJ(I))/(T(I+1)-T(I)))
      DO 60 J=IA,IB
   60 TMPCAL(J)=TMPCAL(J)*((J-IA)*C+ADJ(I))
   80 CONTINUE
      DO 100 I=1,3
      J=T(I)+21.05
  100 TMP(I)=TMPCAL(J)
      WRITE(6,2010)(T(I),VT(I),ADJ(I),I=1,3)
      GO TO 999
C  CONVERT WORDS
  200 CONTINUE
      BATTV = C1+C2*AVG6
      IF(HAVG7.LE.0.) GO TO 999
      VOLT7=HAVG7/100.0
      DO 240 I=2,71
      IF(VOLT7.LT.TMPCAL(I)) GO TO 240
      TA=TMPCAL(I-1)
      TD=TMPCAL(I)-TA
      TMPA=I-21
      TEMPC=(VOLT7-TA)/TD+TMPA
      GO TO 999
  240 CONTINUE
      TEMPC = 50.+5.*(TMPCAL(71)-VOLT7)/(TMPCAL(66)-TMPCAL(71))
      WRITE(6,2020) BATTV,TEMPC,AVG6,HAVG7
  999 RETURN
 1000 FORMAT(2(F5.1,F8.2))
 1010 FORMAT(3(F5.1,F8.2))
 2000 FORMAT('0','BATTERY VOLTAGE = ',F5.1,' +',F6.3,' WORD-6 COUNTS')
 2010 FORMAT('0','TEMPERATURE C  VOLTS  ADJUSTMENT TO SER NO 400 CURVE',
     1 ' TMPCAL',/3(1X,F11.1,F9.3,F7.3/))
 2020 FORMAT(1X,'CONVRT 2020: ',4F10.2)
      END
C ***********************************************************************
C
      SUBROUTINE BLOCK(ICODE)
C
C  BLOCK READS THE OZONE TM TAPE AND CONVERTS ALL TIME WORDS
C
C  EUGENE SHAFFER(SASC)       3/78     KRISHNA TEWARI     6/81
C  E.REED/G.BATLUCK           10/82
C
C  ICODE =0 NO PROBLEM
C        1 END OF FILE
C
      COMMON/LABEL1/IREC,DELTAT,MPEAK,LPEAK,LIMIT
      COMMON /LABEL3/DATA(1210),INPUT(1220)
      COMMON/LABEL5/OUTX(20)
C
      LOGICAL*1 IN1(2),OUT1(2)
      INTEGER*4 SHFTR,SHFTL,DATA
      INTEGER*2 INPUT,IN2,OUT2
      REAL*4 RATA(1210)
```

```
      EQUIVALENCE (IN1(1),IN2),(OUT1(1),OUT2),(RATA(1),DATA(1))
      DATA NREC/0/
C
      ICODE=0
C
C   READ IN RAW SIGNAL DATA.
C
      DO 20 I=1,IREC
      NREC=NREC+1
      LEN = 0
      CALL FREAD(INPUT(1),10,LEN,&110,&10)
      IF(NREC.GE.IREC) GO TO 30
      GO TO 20
   10 WRITE(6,2010) NREC
   20 CONTINUE
   30 J=0
C THE FOLLOWING STATEMENT (NREC.GT.XXX) IS TO BE USED TO STOP
C   PROCESSING CERTAIN FLIGHTS AFTER REACHING A SPECIFIC RECORD.
C     IF (NREC.GT.95) GO TO 110
C CONVERT TO IBM FORMAT
      DO 80 NZ=11,1220
```

```
      J=J+1
      IN2=INPUT(NZ)
      OUT1(2)=IN1(1)
      OUT1(1)=IN1(2)
      INPUT(NZ)=OUT2
   80 DATA(J)=INPUT(NZ)
C  CONVERT TIME WORDS TO (9) DDDHH,(10) MMSS, (11) SECONDS (REAL)
      DO 90 J=9,1208,11
C MILLISECONDS
      LX=DATA(J)
      IF(LX.LT.0) LX=LX+65535
      JSEC=((SHFTR(SHFTL(LX,28),28))+(SHFTR(SHFTL(LX,20),28)*10)
     +   +(SHFTR(LX,12)*100))
      SEC=(FLOAT(JSEC))/1000.
C  MINUTE AND SECOND
      LX=DATA(J+1)
      IF (LX .LT. 0) LX = LX + 65535
      IMIN=((SHFTR(SHFTL(LX,17),29))*10)+(SHFTR(SHFTL(LX,20),28))
C THE FOLLOWING LINE (RE: NREC 1900 OR 1901) IS FOR FLT 295 ONLY.
C     IF (NREC.EQ.1900 .OR. NREC.EQ.1901) IMIN = 8
      ISEC=(SHFTR(SHFTL(LX,24),28))*10+(SHFTR(SHFTL(LX,28),28))
      DATA(J+1) = 100*IMIN+ISEC
C   DAY AND HOUR
      LX=DATA(J+2)
      IF (LX .LT. 0) LX = LX + 65535
      IDAY=(SHFTR(LX,14)*100)+((SHFTR(SHFTL(LX,18),28))*10)
     +   +(SHFTR(SHFTL(LX,22),28))
      IHR=(SHFTR(SHFTL(LX,26),30)*10)+(SHFTR(SHFTL(LX,28),28))
      DATA(J) = 100*IDAY+IHR
      RATA(J+2) =SEC
   90 CONTINUE
      GO TO 999
  110 ICODE=1
      NREC=NREC-1
      WRITE(6,2020)NREC
 2010 FORMAT(1X,'BLOCK 2010: READ ERROR IN RECORD' ,I6)
 2020 FORMAT(1X,'BLOCK 2020: END OF FILE AFTER RECORD',I6)
  999 RETURN
      END
C ***********************************************************************
C
      SUBROUTINE CYCLE(NCODE,NERR)
C
C CYCLE FILLS THE ARRAY 'KEEP' WITH DATA READ BY BLOCK, AND WHICH
C HAS ACCEPTABLE VALUES FOR WORD7 (MARKER/REFERENCE).  TIME SPAN
C FOR EACH OF THE 4 FILTERS IS DETERMINED AND AVERAGE VALUES
C OBTAINED.
C
C E.REED/G.BATLUCK   OCTOBER 1982
C S.COOKE            2/14/83         ADDED CMPAVE
C
C  ARGUMENTS:
C  NCODE  =0 NO PROBLEM
C          1 END OF FILE ON INPUT TAPE
C         -1 PROBLEMS IN OBTAINING AVERAGES
C  NERR  = NUMBER OF AVERAGES SET TO -99.
C OUTX IS WRITTEN ON THE EDIT OZONE TAPE.  CONTENTS OF RECORD IS (R*4)
```

```
C WORD 1 S0 (WORD 1) SEC SINCE START HOUR 11 S0 (1) VALUE OF COMP WORD
C      2 S1       2  SEC SINCE START HOUR 12 S1 (2) VALUE OF COMP WORD
C      3 S2       4  SEC SINCE START HOUR 13 S2 (4) VALUE OF COMP WORD
C      4 S3       5  SEC SINCE START HOUR 14 S3 (5) VALUE OF COMP WORD
C      5 S0       1  AVERAGE VALUE COUNTS 15 LENGTH OF CYCLE (SECONDS)
C      6 S1       2  AVERAGE VALUE COUNTS 16 LENGTH OF CYCLE 10 C AVERAG
C      7 S2       4  AVERAGE VALUE COUNTS 17 AVE VAL OF COMPWORD
C      8 S3       5  AVERAGE VALUE COUNTS 18 BASE     10 C AVERAGE
C      9 MARKER PULSE AVERAGE VALUE COUNT 19 BATTERY VOLTAGE (VOLTS)
C     10 BASE LEVEL  AVERAGE VALUE COUNTS 20 TEMPERATURE DEG CELSIUS
C
C  IS INDEX FOR DATA ARRAY
C  KS INDEX OF LAST VALID DATA IN KEEP ARRAY
C
C KEEP:
C      1 - WORD 1 S0          5 - WORD 5 S3
C      2 - WORD 2 S1          6 - WORD 7 MARKER/BASE
C      3 - WORD 3 COMP        7 - WORD 8 UNCOMP
C      4 - WORD 4 S2          8 TIME - ELAPSED SEC.
      INTEGER *2 INPUT
      INTEGER *4 DATA,KEEP(8,200)
```

```
      DIMENSION TIME(8,200),RATA(11,110),COMP(4)
C
      COMMON/LABEL1/IREC,DELTAT,MPEAK,LPEAK,LIMIT
      COMMON/LABEL3/DATA(11,110),INPUT(1220)
      COMMON/LABEL5/OUTX(20)
C
      EQUIVALENCE (DATA(1,1),RATA(1,1)),(KEEP(1,1),TIME(1,1)),
     X(COMP(1),OUTX(11))
      DATA IFLAG/-1/,IS/0/,KS/0/,PASTIM/0./,NSIX/0/
C
      IF(IFLAG.NE.-1) GO TO 10
      MPHI = MPEAK +LIMIT
      MPLO = MPEAK-LIMIT
      LPHI = LPEAK +LIMIT
      LPLO = LPEAK-LIMIT
      CTEN=DELTAT
      NERR=0
      INIT = 0
      LASTDM = 0
      LASTMS = 0
      IFLAG =1
C FILL KEEP/TIME WITH VALUES
C
   10 IF(IS.NE.0) GO TO 40
   20 IF (NCODE .EQ. 1) GO TO 990
      CALL BLOCK(NCODE)
      IF(NCODE.EQ.1) GO TO 900
      IF(NSIX.NE.0) SAVE6=FLOAT(KSIX)/NSIX
      NSIX=0
      IS = 0
      KSIX=0
C SELECT FRAMES
   40 IS = IS +1
      IF(IS .GT.110) GO TO 20
      IDH = DATA(9,IS)
      IMS = DATA(10,IS)
      IF (IMS .LT. LASTMS .AND. IDH .EQ. LASTDH) GO TO 40
      LASTDH = IDH
      LASTMS = IMS
      I=DATA(7,IS)
      IF((I.GE.LPLO.AND.I.LE.LPHI).OR.(I.GE.MPLO.AND.I.LE.MPHI))GO TO 60
      GO TO 40
   60 KS=KS+1
C MOVE INTO KEEP
      DO 65 J=1,5
   65 KEEP(J,KS)=DATA(J,IS)
      KEEP(6,KS) = I
      KEEP(7,KS)=DATA(8,IS)
      SEC = (60*(DATA(10,IS)/100)+MOD(DATA(10,IS),100))+RATA(11,IS)
      IF((SEC+3300.).LT.PASTIM)SEC=SEC+3600.
      TIME(8,KS)=SEC
      PASTIM=SEC
C SUM DATA FOR BATTERY VOLTAGE
      J=DATA(6,IS)
C     WRITE(6,2946) KS,IS,I,(KEEP(JZ,KS),JZ=1,7),SEC,J,NSIX,KSIX
      IF(J.LE.0.OR.J.GE.1023) GO TO 70
      NSIX=NSIX+1
```

```
      KSIX=KSIX+J
   70 IF(KS.LT.200) GO TO 40
      KLIM=200
C FIND BEGIN AND END OF CYCLE(ONE FILTER WHEEL ROTATION)
C FIND BASE
  100 J=0
      K=100
      IF(K.GT.KLIM) K=KLIM
      DO 110 I=1,K
C     IA=KEEP(6,I)
      IF(KEEP(6,I).GT.LPHI) GO TO 110
      J=I
C     WRITE(6,2947) J,IA,K
      GO TO 115
  110 CONTINUE
      IF(J.EQ.0) GO TO 910
C FIND START OF MARKER PULSE
  115 IM=0
      DO 120 I=J,KLIM
C     IZ=KEEP(6,I)
      IF(KEEP(6,I).LT.MPLO) GO TO 120
```

```
      IM=I
      TM=TIME(8,I)
C     WRITE(6,2948) I,IZ,J,KLIM,IZ,IM,TM
      GO TO 125
  120 CONTINUE
      GO TO 920
C FIND END OF MARKER PULSE
  125 NM=0
      DO 130 I=IM,KLIM
C     IC=KEEP(6,I)
      IF(KEEP(6,I).GT.LPHI) GO TO 130
      IB=I
      TB=TIME(8,I)
      NM=I-1
C     WRITE(6,2949)I,IC,IM,TB
      GO TO 135
  130 CONTINUE
      IF(NM.EQ.0) GO TO 930
C FIND END OF CYCLE
  135 NB=0
      DO 140 I=IB,KLIM
C     ID=KEEP(6,I)
      IF(KEEP(6,I).LT.MPLO) GO TO 140
      IM2=I
      TM2=TIME(8,I)
      NB=I-1
C     WRITE(6,2951)I,ID,TM2
      GO TO 150
  140 CONTINUE
      IF(NB.EQ.0) GO TO 910
      IF((NB-IB).LT.3) GO TO 945
  150 CTIME=TM2-TM
      NSAMP = IM2-IM+1
C     WRITE(6,2941) CTIME,CTEN,MPEAK,LPEAK,LIMIT,MPLO,LPHI
      IF(CTIME.LT.(0.7*CTEN).OR.CTIME.GT.(1.3*CTEN)) GO TO 940
C COMPUTE AVERAGE VALUES
C MARKER PULSE
      CALL AVG(KEEP,6,IM,NM,SAVEM)
      IF(SAVEM.LT.0.) NERR=NERR+1
C BASE
      CALL AVG(KEEP,6,IB,NB,SAVEB)
      IF(SAVEB.LT.0.) NERR=NERR+1
C S0 (WORD 1)
      CALL AVG(KEEP,1,IM,NB,SAVEZ)
      IF(SAVEZ.LT.0.) NERR=NERR+1
C S1 (WORD 2)
      T=TIME(8,IB)+0.94*CTIME
      DO 210 I=IM2,KLIM
      IF(TIME(8,I).LT.T) GO TO 210
      IN1=I
      GO TO 215
  210 CONTINUE
      IN1=KLIM
  215 CALL AVG(KEEP,2,IB,IN1,SAVE1)
      IF(SAVE1.LT.0.) NERR=NERR+1
C     WRITE(6,2952) SAVEM,SAVEB,SAVEZ,SAVE1,T,IN1
C S2 (WORD 4)
```

```
      BSTIME=TIME(8,IM2)-TIME(8,IB)
      T=TIME(8,IB)+0.333*BSTIME
      DO 220 I=IB,NB
      IF(TIME(8,I).LT.T) GO TO 220
      I2=I
      T2=TIME(8,I2)
C     WRITE(6,2953) IB,I2,T,T2,TIME(8,I)
      GO TO 222
  220 CONTINUE
  222 T=T2 + .88*CTIME
      DO 224 I=IM2,KLIM
      IF(TIME(8,I).LT.T) GO TO 224
      IN2=I-1
C     WRITE(6,2954) IM2,IN2,TIME(8,IN2)
      GO TO 226
  224 CONTINUE
      IN2=KLIM
  226 CALL AVG(KEEP,4,I2,IN2,SAVE2)
      IF(SAVE2.LT.0.) NERR=NERR+1
C S3 (WORD 5)
      T=TIME(8,IB)+0.667*BSTIME
```

```
      DO 230 I=I2,NB
      IF(TIME(8,I).LT.T) GO TO 230
      I3=I
      T3=TIME(8,I)
C     WRITE(6,2955) SAVE2,T,T3,I3
      GO TO 232
  230 CONTINUE
  232 T=T3+0.82*CTIME
      DO 234 I=IM2,KLIM
      IF(TIME(8,I).LT.T) GO TO 234
      IN3=I-1
      GO TO 236
  234 CONTINUE
C     WRITE(6,2970) I,IM2,KLIM,TIME(8,I),T,IN3
 2970 FORMAT (1X,'CYCLE 2970: ',3I5,2F12.4,I5)
      IN3 = KLIM
  236 CALL AVG(KEEP,5,I3,IN3,SAVE3)
C     WRITE (6,2980) SAVE3
 2980 FORMAT (1X,'CYCLE 2980: ',F10.4)
      IF(SAVE3.LT.0.) NERR=NERR+1
      IF(NERR.GT.300) GO TO 950
C OBTAIN TEMPERATURE AND BATTERY VOLTAGE
C     WRITE(6,2956) IN3,SAVE3,SAVE6
      CALL CONVRT(OUTX(18),OUTX(19),SAVE6,SAVEM,2)
C UPDATE 10-CYCLE AVERAGES FOR CYCLE LENGTH,MARKER VALUE, AND BASE
      IF (INIT.EQ.1 .AND. (TM-PASTM).GT.25.) INIT = 0
      CALL TENAVE(CTIME,CTEN,SAVEM,TENM,SAVEB,TENB,INIT)
      INIT = 1
      PASTM = TM
C     WRITE(6,2957) TENM,TENB
      MPHI=TENM+LIMIT
      MPLO=TENM-LIMIT
      LPHI=TENB+LIMIT
      LPLO=TENB-LIMIT
C FIND CORRESPONDING VALUE OF COMP CHANNEL FOR EACH
      CALL COMPWD(KEEP,IM,IB,I2,I3,NB,COMP,CMPAVE)
C     WRITE(6,2958) COMP,KLIM
C MOVE UP DATA IN KEEP/TIME
      KLIM=200-IM2+2
      J=4*(KLIM)*8
C     WRITE(6,2944) (KEEP(KW,1),KW=1,8)
      CALL CMUVE(KEEP(1,IM2-1),KEEP(1,1),J)
C     WRITE(6,2945)(KEEP(KV,1),KV=1,8)
C     WRITE(6,2945)(KEEP(KV,KLIM),KV=1,8),KLIM
      KS=KLIM
C FILL OUTX
      OUTX(1)=TM
      OUTX(2)=TB
      OUTX(3)=T2
      OUTX(4)=T3
      OUTX(5)=SAVEZ
      OUTX(6)=SAVE1
      OUTX(7)=SAVE2
      OUTX(8)=SAVE3
      OUTX(9)=SAVEM
      OUTX(10)=SAVEB
      OUTX(15)=CTIME
```

```
      OUTX(16)=CTEN
      OUTX(17)=CMPAVE
      OUTX(20)=N3AMP
C     WRITE(6,2943) (OUTX(KP),KP=1,10),(OUTX(KZ),KZ=15,18)
      GO TO 999
C ODDS AND ENDS
C END OF FILE FROM BLOCK-MOVE UP AND PROCESS DATA STILL IN KEEP/TIME
  900 KLIM=201-NB
      J=KLIM*32
      CALL CMOVE(KEEP(1,NB),KEEP(1,1),J)
      GO TO 100
C 100 CONSECUTIVE BASE VALUES - MOVE UP AND REFILL KEEP/TIME
  910 IF(K.LT.100) GO TO 990
      CALL CMOVE(KEEP(1,100),KEEP(1,1),3232)
      KS=101
      GO TO 40
C NO MARKER PULSE - MOVE UP AND REFILL KEEP/TIME
  920 IF (KLIM .NE. 200) GO TO 990
      CALL CMOVE(KEEP(1,200),KEEP(1,1),32)
      KS=1
      GO TO 40
```

```
C NO BASE AFTER MARKER PULSE
  930 IF (KLIM .NE. 200) GO TO 990
      KLIM=200-IM
      IF(KLIM.GE.150) GO TO 933
      IF (KLIM .LE. 0) KLIM = 1
      K=32*KLIM
      J=IM
      CALL CMOVE(KEEP(1,J),KEEP(1,1),K)
      KS=KLIM
      GO TO 40
  933 KS=0
      GO TO 40
C CYCLE LENGTH TOO SHORT OR TOO LONG OR TOO FEW SAMPLES AT BASE VALUE
  940 WRITE(6,2940) CTIME,NSAMP,IM,NM,IB,NB,IM2,TM,TB,TM2
  945 IF(NB.LE.2) NB = 3
      KLIM=200-NB
      K=32*KLIM
      J=NB-1
      CALL CMOVE(KEEP(1,J),KEEP(1,1),K)
      KS=KLIM
      GO TO 40
C TOO MANY PROBLEMS IN FINDING AN AVERAGE
  950 WRITE(6,2950)
      NCODE=-1
      GO TO 999
C NO MORE DATA(NCODE=1)
  990 WRITE(6,2990)
      NCODE = 1
 2950 FORMAT(1X,'CYCLE 2950: STOP BECAUSE OF PROBLEMS IN AVERAGING')
 2940 FORMAT(1X,'CYCLE 2940:CYCLE REJECTED. LENGTH WAS', F10.4,
     X I7,' SAMPLES',5I6,3F10.4)
 2990 FORMAT(1X,'CYCLE 2990: LESS THAN 100 SAMPLES REMAIN')
 2941 FORMAT(1X,'CYCLE 2941: ',2F10.4,5I8)
 2943 FORMAT(1X,'C2943:',14F9.3)
 2946 FORMAT(1X,'CYCLE 2946: ',2I5,I7,7I10,F10.4,3I6)
 2947 FORMAT(1X,'CYCLE 2947: ',3I10)
 2948 FORMAT(1X,'CYCLE 2948: ',6I10,F12.4)
 2949 FORMAT(1X,'CYCLE 2949: ',3I10,F12.4)
 2951 FORMAT(1X,'CYCLE 2951: ',2I10,F12.4)
 2952 FORMAT(1X,'CYCLE 2952: ',5F12.4,I10)
 2953 FORMAT(1X,'CYCLE 2953: ',2I10,3F12.4)
 2954 FORMAT(1X,'CYCLE 2954: ',2I10,F12.4)
 2955 FORMAT(1X,'CYCLE 2955: ',3F12.4,I10)
 2956 FORMAT(1X,'CYCLE 2956: ',I10,2F12.4)
 2957 FORMAT(1X,'CYCLE 2957: ',2F12.4)
 2958 FORMAT(1X,'CYCLE 2958: ',4F12.4,I6)
 2944 FORMAT(1X, 'BEFORE CMOVE ',7I10,F12.4)
 2945 FORMAT(1X,'AFTER CMOVE  ',7I10,F12.4,I4)
  999 RETURN
      END
C ********************************************************************
C
      SUBROUTINE AVG(KEEP,N,IS,IN,SAVE)
C
C DATA IN KEEP, BETWEEN FRAMES IS AND IN.  THE RESULT IS PLACED IN SAVE.
C
C REED/BATLUCK   DECEMBER 1982
```

```
C
C ARGUMENTS: KEEP  2-D ARRAY OF DATA
C             N     FIRST INDEX OF ARRAY
C             IS,IN START AND END VALUES OF SECOND INDEX
C              SAVE  AVERAGE VALUE
      DIMENSION KEEP(8,200)
      EQUIVALENCE(TIME,ITIM)
      NPTS=IN-IS+1
      IF(NPTS.GT.1) GO TO 20
      SAVE=KEEP(N,IS)
      GO TO 999
   20 IF(NPTS.GT.2) GO TO 30
      IF(IABS(KEEP(N,IS)-KEEP(N,IN)).GT.6) GO TO 300
      SAVE = (KEEP(N,IS)+KEEP(N,IN)) *0.5
      GO TO 999
C
   30 MIN = 1 + NPTS/2
      DO 200 IT=IS,IN
      ITEST=KEEP(N,IT)
      ISUM=0
      M=0
```

```
      DO 100 J=IS,IN
      IF(IABS(KEEP(N,J)-ITEST).GT.3) GO TO 100
      ISUM = ISUM+KEEP(N,J)
      M=M+1
  100 CONTINUE
      IF(M.LT.MIN) GO TO 200
      SAVE = FLOAT(ISUM)/M
      GO TO 999
  200 CONTINUE
C  FEWER THAN HALF THE POINTS WERE WITHIN 6 OF EACH OTHER
  300 SAVE=-99.0
      ITIM=KEEP(8,IS)
C     WRITE(6,2300)N,TIME,(KEEP(N,I),I=IS,IN)
 2300 FORMAT(1X,'AVG 2300: NO AVERAGE FOR WORD AND TIME',I3,F10.3/
     X (1X,33I4)/)
  999 RETURN
      END
C ********************************************************************
C
      SUBROUTINE TENAVE(CTIME,CTEN,SAVEM,TENM,SAVEB,TENB,INIT)
C
C TENAVE COMPUTES A TEN-CYCLE RUNNING AVERAGE OF CTIME,SAVEM AND SAVEB
C
C REED/BATLUCK    OCTOBER 1982
C
C ARGUMENTS: CTIME,SAVEM,SAVEB,ARE NEW VALUES FOR CURRENT CYCLE.
C            CTEN,TNEM AND TENB ARE THE UPDATED 10-CYCLE AVERAGE
C
      DIMENSION VALUE(3,10)
      DATA VALUE(1,1)/0./
C
      IF(INIT.NE.0.) GO TO 200
C FIRST TIME
      VALUE(1,1)=CTIME/10.
      VALUE(2,1)=SAVEM/10.
      VALUE(3,1)=SAVEB/10.
      CALL CMOVE(VALUE(1,1),VALUE(1,2),108)
      SUM1=CTIME
      SUM2=SAVEM
      SUM3=SAVEB
       GO TO 900
C SUCCEEDING UPDATES
  200 IF(CTIME.GT.0) SUM1=SUM1-VALUE(1,1)+CTIME/10.
      IF(SAVEM.GT.0) SUM2=SUM2-VALUE(2,1)+SAVEM/10.
      IF(SAVEB.GT.0) SUM3=SUM3-VALUE(3,1)+SAVEB/10.
      CALL CMOVE(VALUE(1,2),VALUE(1,1),108)
      IF(CTIME.GT.0) VALUE(1,10)=CTIME/10.
      IF(SAVEM.GT.0) VALUE(2,10)=SAVEM/10.
      IF(SAVEB.GT.0) VALUE(3,10)=SAVEB/10.
  900 CTEN=SUM1
      TENM=SUM2
      TENB=SUM3
      RETURN
      END
C ********************************************************************
C
      SUBROUTINE COMPWD(KEEP,IM,IB,I2,I3,NB,COMP,CMPAVE)
```

```
C
C COMP FINDS THE VALUE OF THE COMPENSATION CHANNEL CORRESPONDING
C TO THE TIME OF EACH FILTER.  IT CHOOSES THE FRAME NEAR THE STATED
C FRAME WITH THE MAXIMUM VALUE IN THE UNCOMP CHANNEL, AND USES THE
C CORRESPONDING VALUE FROM THE COMP CHANNEL. CMPAVE IS THE AVERAGE
C VALUE DURING THE CYCLE.
C
C REED/BATLUCK    OCTOBER 1982
C S.COOKE         2/14/83          ADDED CMPAVE
C
C KEEP ARRAY OF DATA
C IM,IB,I2,I3 START POSITION FOR EACH OF THE FILTERS
C COMP ARRAY OF COMP CHANNEL VALUES CORRESPONDING TO EACH.
C
      DIMENSION KEEP(8,200),COMP(4),LMX(4)
      LMX(1)=IM
      LMX(2)=IB
      LMX(3)=I2
      LMX(4)=I3
      DO 100 L=1,4
      MAX=LMX(L)
```

```
      J=MAX-2                                                           00007020
      IF(J.LT.1) J=1                                                    00007030
      K=MAX+2                                                           00007040
      NTEST=KEEP(7,MAX)                                                 00007050
      DO 50 I=J,K                                                       00007060
      IF( KEEP(7,I).LT.NTEST) GO TO 50                                  00007070
      NTEST=KEEP(7,I)                                                   00007080
      MAX=I                                                             00007090
   50 CONTINUE                                                          00007100
  100 COMP(L)=KEEP(3,MAX)                                               00007110
      N=0                                                               00007120
      ISUM=0                                                            00007130
      DO 200 I=IM,NB                                                    00007140
      NTEST=KEEP(3,I)                                                   00007150
      IF (NTEST .LE. 0) GO TO 200                                       00007160
      ISUM=ISUM+NTEST                                                   00007170
      N=N+1                                                             00007180
  200 CONTINUE                                                          00007190
      IF (N .NE. 0) GO TO 220                                           00007200
      CMPAVE=0.                                                         00007210
      GO TO 999                                                         00007220
  220 CMPAVE=FLOAT(ISUM)/N                                              00007230
  999 RETURN                                                            00007250
      END                                                               00007260

*** END OF MEMBER ***    803 RECORDS PROCESSED   ************************************************************
```

```
C
C
C*****************************************************************
C
C       MERGE OZONE                       6/10/80
C       EDITION:    1
C          LANGUAGE:    FORTRAN
C          COMPUTER:    IBM 360/75, 360/91
C          OPERATING SYSTEM:  G. S. F. C.
C       PROGRAMMER:     EUGENE H. SHAFFER/SASC
C          LON. DEG. E; 4 WORD RADAR RECORD; DD=DH      S. COOKE   11/83
C
C       PURPOSE:
C          A PROGRAM TO MERGE THE DIGITIZED RADAR DATA AND THE
C          EDITED OZONE DATA.  ALSO TO COMPUTE THE ZENITH ANGLE.
C
C  REED/BATLUCK 12-82 MINOR REVISIONS, CHANGED RECORD FORMATS
C  COOKE        03-83 MINOR REVISIONS, ADDED PEDIGREE, ETC
C               04-83 MINOR REVISIONS
C               11-83 REVISIONS FOR NEW RADAR TAPES
C**************************************************************
C
C      VARIABLES:
C           NAME            TYPE  I/O  DESCRIPTION
C           ----            ----  ---  -----------
C       INTERNAL
C           MODE            I*4    I   = 1 FOR 7-TRACK RADAR MESUP TAPE
C                                      = 2 FOR 9-TRACK ECLIPSE PASS1 TAPE
C           EDITED          L*1    I   INPUT TAPE FOR EDITED DATA
C           ERD(20)         R*4    I   ARRAY FOR EDITED DATA
C           H1              R*4    I   RADAR DATA HEIGHT
C           HOUR            R*4    I   LAUNCH TIME HOUR
C           IBEG            I*4    I   BEGINNING RECORD NUMBER
C           IUNIT           I*4    I   UNIT NUMBER FOR EDITED TAPE
C           IUNIT1          I*4    I   UNIT NUMBER FOR MERGED TAPE
C           IUNIT2          I*4    I   UNIT NUMBER FOR RADAR TAPE
C           LAT0            R*4    I   LATITUDE OF LAUNCH SITE
C           LOCA            I*4    I   LOCATION OF LAUNCH SITE
C           LONO            R*4    I   LONGITUDE OF LAUNCH SITE
C           MERGED(6)       L*1    I   OUTPUT TAPE FOR MERGED DATA
C           NBAD            I*4    I   NUMBER OF BAD RECORDS
C           NF              I*4    I   FILE NUMBER FOR EDITED TAPE
C           NF1             I*4    I   FILE NUMBER FOR MERGED TAPE
C           NF2             I*4    I   FILE NUMBER FOR RADAR TAPE
C           RAD(13)         R*4    I   RADAR DATA ARRAY (MODE 1)
C           RAD2(4)         R*8    I   RADAR DATA ARRAY (MODE 2)
C           RADAR(6)        L*1    I   INPUT TAPE FOR RADAR DATA
C           RESTR           R*4    I   TIME CORRECTION
C           S               R*4    I   RADAR DATA: NORTH/SOUTH RANGE
C           STIME           R*4    I   LAUNCH TIME IN SECONDS SINCE THE
C                                        HOUR
C           T1              R*4    I   RADAR DATA: TIME (SEC)
C           W               R*4    I   RADAR DATA: EAST/WEST RANGE
C           ZEN(60)         R*4    O   COMPUTED ZENITH ANGLE
C       COMMON/Z/
C           DD,DM,DS,DECOR  R*4    I   EPHEMERIS DATA: DECLINATION(ANGLE)
```

```
C           RH,RM,RS,RACOR R*4    I    EPHEMERIS DATA: RIGHT ASCENSION
C           SH,SM,SS       R*4    I    EPHEMERIS DATA: SIDEREAL TIME
C           SOLARZ         R*4    O    ZENITH ANGLE
C
C
C***********************************************************************
C
C       SUBROUTINES CALLED
C          MOUNT
C          FREAD
C          ZENITH
C          AITKEN
C          RPDATO
C          FWRITE
C          RADAR2
C
C************************************************************************
C
      DIMENSION T1(3000),H1(3000),ERD(20),RAD(13),RLON(6),RLAT(6),
     *TIME(4),ALT(4),TZ(60),ZEN(60),M(3000),S(3000),BAD1(20),BAD2(20),
     *PED(20),IYMD(3)
```

```
      LOGICAL*1 EDITED(6),RADAR(6),MERGED(6),LAUNCH(30)
      LOGICAL*4 SITE(4)
      REAL*4 LAT0,LON0
      REAL*8 RAD2(4),SUM
      REAL*8 TMTAP/'OZONE   '/,RDTAP/'RADAR   '/,MRTAP/'MERGE   '/,
     1 PLACE(6)/'WALLOPS ','CHURCHIL','NATAL   ','PRIMROSE',
     2 'POKER FL','MARAMBIO'/
      EQUIVALENCE (RAD(10),SITE(1))
      COMMON /Z/RH,RM,RS,RACOR,DD,DM,DS,DECOR,
     *SH,SM,SS,GMT,REH,RNS,SOLARZ
      COMMON/TEMPER/ NUM(100,3),SUM(100,3),TOP(100,3),BOT(100,3)
      DATA RLON/-75.48,-94.07,-35.25,-110.08,-147.48,-56.72/
      DATA RLAT/37.85,58.75,-5.92,54.80,65.12,-64.24/
C
      LINE = 0
      LEN = 0
      LEN1 = 0
      LENF = 0
C
C   READ IN TAPE INFORMATION, EPHEMERIS DATA, AND LOCATION
C
      READ(5,1000) EDITED,NF,IUNIT
      READ(5,1000)MERGED,NF1,IUNIT1
      READ(5,1000) RADAR,NF2,IUNIT2,MODE
      READ (5,1020) PED(2)
      READ (5,1050) LOCA,RESTR,IBEG,NBAD,LAUNCH
      IF (LOCA.EQ.0.  .OR. LOCA.GT.6.) GO TO 950
      READ(5,1100)RH,RM,RS,RACOR
      READ(5,1100)DD,DM,DS,DECOR
      READ (5,1100) SH,SM,SS,HOUR
      IF (MODE .EQ. 2) GO TO 540
   14 IF (NBAD.EQ.0) GO TO 15
      IF(NBAD.GT.20) NBAD=20
      DO 15 I=1,NBAD
      READ (5,1150) BAD1(I),BAD2(I)
   15 CONTINUE
C
C   PRINT OUT HEADER, TAPE INFORMATION,EPHEMERIS DATA, AND LOCATION
C
      WRITE (6,2010)
      WRITE (6,2020)
      WRITE (6,2010)
      WRITE (6,2030)
      WRITE (6,2040) TMTAP,EDITED,IUNIT,NF
      WRITE (6,2040) RDTAP,RADAR,IUNIT2,NF2
      IF (MODE.NE.2) WRITE(6,2041)
      IF (MODE.EQ.2) WRITE(6,2042)
 2041 FORMAT ('+',83X,'MESUP')
 2042 FORMAT ('+',83X,'PASS1')
      WRITE (6,2040) MRTAP,MERGED,IUNIT1,NF1
      WRITE (6,2050)
      WRITE (6,2010)
      IF (MODE .EQ. 2) WRITE(6,2015) RAD,STIME
 2015 FORMAT('0','RADAR PED: ',F5.0,2X,F4.0,2X,F4.0,2X,F7.0,2X,F8.1,2X,
     X F7.3,2X,F8.3,2X,F7.0,2X,F7.0,2X,4A4,' LAUNCH TIME=',F7.0,
     X ' SECONDS')
      WRITE (6,2060)
```

```
      WRITE(6,2070)PLACE(LOCA),RH,RM,RS,RACOR,DD,DM,DS,
     1    DECOR,SH,SM,SS,HOUR,RESTR,LAUNCH
      WRITE(6,2090)
      WRITE(6,3000) IBEG,NBAD
      IF(NBAD.GT.0) WRITE(6,2095)(BAD1(I),BAD2(I),I=1,NBAD)
      WRITE (6,2050)
      WRITE (6,2010)
      WRITE (6,2050)
C
C   MOUNT ALL INPUT/OUTPUT TAPES
C
      CALL MOUNT(1,IUNIT,EDITED,NF)
      CALL MOUNT(2,IUNIT1,MERGED,NF1)
      CALL MOUNT(1,IUNIT2,RADAR,NF2)
      LONG=RLON(LOCA)
      LATO=RLAT(LOCA)
C
C VERIFY EQUIVALENCE OF RADAR AND EDIT FLIGHT NUMBERS.
C
      IF (MODE .EQ. 2) GO TO 17
      CALL FREAD(RAD(1),IUNIT2,LEN1,*560,*580)
```

```
   17 CALL FREAD(ERD(1),IUNIT,LEN,*570,*590)
      IF (RAD(2) .NE. ERD(2)) GO TO 550
C
C WRITE RADAR AND EDIT PEDIGREES ON MERGE TAPE.
      CALL FWRITE(RAD(1),IUNIT1,LENF)
      LINE = LINE + 1
      CALL FWRITE(ERD(1),IUNIT1,LENF)
      LINE = LINE + 1
C
C ESTABLISH PEDIGREE ARRAY AND WRITE ON MERGE TAPE.
      PED(1) = -300.
      CALL RPDATO(1,IYMD)
      PED(3) = IYMD(2)*10000 + IYMD(3)*100 + IYMD(1)
      PED(4) = RH
      PED(5) = RM
      PED(6) = RS
      PED(7) = RACOR
      PED(8) = DD
      PED(9) = DM
      PED(10) = DS
      PED(11) = DECOR
      PED(12) = SH
      PED(13) = SM
      PED(14) = SS
      DO 20 I = 15,20
         PED(I) = 0.0
   20    CONTINUE
      CALL FWRITE(PED(1),IUNIT1,LENF)
      LINE = LINE + 1
      WRITE (6,3020) PED
 3020 FORMAT ('OPEDIGREE:',//,1X,F5.0,2X,F5.1,1X,F7.0,3F6.2,8(1X,F8.2),
     1 6(1X,F2.0))
      WRITE (6,2005)
C
C   READ IN RADAR DATA UP TO 3000 RECORDS
C
      N=0
      IF (MODE .EQ. 2) GO TO 545
      DO 100 I=1,3000
      CALL FREAD(RAD(1),IUNIT2,LEN1,*200,*910)
      IF(I.EQ.1) GO TO 90
      IF(ABS(RAD(1)-T1(N)) .GT.90. .OR. ABS(RAD(8)-H1(N)).GT.
     1 (H1(N)*0.5))GO TO 100
   90 N=N+1
      T1(N)=RAD(1)
      H1(N)=RAD(8)
      S(N)=RAD(6)
      W(N)=RAD(7)
  100 CONTINUE
  200 CONTINUE
C
C      COMPUTE ZENITH ANGLE FOR EACH 60 SECONDS
C
  210 K=0
      DO 220 KK=1,N,60
      K=K+1
      TZ(K)=T1(KK)
```

```
      GMT=HOUR+(TZ(K)/3600.)
      RNS=S(KK)
      REW=W(KK)
      CALL ZENITH(LONO,LATO,MODE)
      ZEN(K)=SOLARZ
  220 CONTINUE
C
C    READ IN EDITED OZONE DATA
C
      IBEG=IBEG-1
      IF (IBEG .EQ. 0) GO TO 300
      DO 290 IC=1,IBEG
      CALL FREAD (ERD(1),IUNIT,LEN,*920,*930)
  290 CONTINUE
  300 CONTINUE
      N1=1
      CALL FREAD(ERD(1),IUNIT,LEN,*920,*930)
      IF (NBAD .EQ. 0) GO TO 370
      DO 350 IC=1,NBAD
  350 IF (ERD(1).GT.BAD1(IC).AND.ERD(1).LT.BAD2(IC)) GO TO 300
  370 CONTINUE
```

```
      CYC = ERD(15)
      SAM = ERD(20)
      TEM = ERD(19)
      BAT = ERD(18)
      CAV = ERD(17)
      DO 450 J=1,4
      IF (ERD(J) .LT. RESTR) ERD(J)=ERD(J)+3600.
      IF (ERD(J) .GT. T1(N)) GO TO 940
C  SEARCH FOR CORRESPONDING RADAR DATA
      DO 400 JJ=N1,N
      JS=JJ
      IF(T1(JJ).GT.ERD(J))GO TO 420
  400 CONTINUE
      GO TO 450
  420 CONTINUE
      JS=JS-2
      IF(JS.LE.0) JS=1
      JE=JS+3
      II=0
      DO 430 I=JS,JE
      II=II+1
      TIME(II)=T1(I)
      ALT(II)=H1(I)
  430 CONTINUE
      T2=ERD(J)
C
C       INTERPOLATE FOR ALTITUDE
C
      ERD(J+15)=AITKEN(TIME,ALT,T2,4)
      N1=JS+2
  450 CONTINUE
C
C       INTERPOLATE FOR ZENITH ANGLE
C
      DO 500 JJ=1,K
      JS=JJ
      IF(TZ(JJ).GT.ERD(1)) GO TO 520
  500 CONTINUE
  520 CONTINUE
      JS=JS-2
      IF(JS.LE.0) JS=1
      JE=JS+3
      IF (JE.GT.K) JE=K
      II=0
      DO 530 I=JS,JE
      II=II+1
      TIME(II)=TZ(I)
      ALT(II)=ZEN(I)
  530 CONTINUE
      T2=ERD(1)
      ERD(20)=AITKEN(TIME,ALT,T2,II)
      ERD(2) = CYC
      ERD(3) = SAM
      ERD(4) = TEM
      ERD(10) = BAT
      ERD(15) = CAV
      CALL FWRITE(ERD(1),IUNIT1,LENF)
```

```
      WRITE(6,2000)ERD
      LINE=LINE+1
      CALL TMPAVE(ERD)
      GO TO 300
C
C CREATE RADAR PEDIGREE RECORD IF RADAR INPUT IS 9 TRACK ECLIPSE PASS1
C TAPE (MODE 2).
  540 READ(20,1540) (RAD(I),I=1,8)
 1540 FORMAT(F5.0,2X,F4.0,2X,F4.0,2X,F7.0,2X,F8.1,2X,F7.3,2X,F8.3,2X,
     X F7.0)
  542 READ(20,1542) SITE,STIME
 1542 FORMAT(4A4,2X,F7.2)
      CALL RPDATO(1,IYMD)
      RAD(9) = IYMD(2)*10000 + IYMD(3)*100 + IYMD(1)
      GO TO 14
C
C READ INPUT DATA FROM 9 TRACK ECLIPSE MESUP TAPE (MODE 2).
  545 CALL RADAR2(RAD2,T1,H1,S,W,STIME,N,IUNIT2)
      GO TO 210
C
C CONFLICT IN RADAR AND EDIT FLIGHT NUMBERS.
```

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```
  550 WRITE (6,2550) RAD(2),ERD(2)
      STOP
C
C RADAR PEDIGREE NOT IN RECORD 1.
  560 WRITE (6,2560)
      STOP
C
C EDIT PEDIGREE NOT IN RECORD 1.
  570 WRITE (6,2570)
      STOP
C
C ERROR IN RADAR PEDIGREE.
  580 WRITE (6,2580)
      STOP
C
C ERROR IN EDIT PEDIGREE.
  590 WRITE (6,2590)
      STOP
C
C  ERROR IN RADAR TAPE
  910 WRITE(6,2910) I
      GO TO 100
C EOF ON TM TAPE
  920 WRITE(6,2920)
      GO TO 999
C ERROR ON TM TAPE
  930 WRITE(6,2930)
      GO TO 300
C NO RADAR DATA FOR TM TIME
  940 WRITE(6,2940) ERD(J),T1(N)
      GO TO 999
  950 WRITE (6,2950) LOCA
 2950 FORMAT(' MAIN 2950:  LOCA = ',I2,' OUT OF RANGE')
  999 CONTINUE
      IF (LINE.GT.10) CALL PRINTM
      WRITE(6,2999)LINE
      STOP
 1000 FORMAT(1X,6A1,4X,2I5,3X,I2)
 1020 FORMAT(F5.1)
 1050 FORMAT (I1,26X,F6.1,2X,I3,2X,I2,30A1)
 1100 FORMAT(10X,4F10.2)
 1150 FORMAT(F6.1,2X,F6.1)
 2000 FORMAT(1X,F9.3,F6.3,F4.0,F5.1,5F5.0,F5.2,4F5.0,F6.1,4F8.1,F8.2)
 2005 FORMAT('1   S0 SEC CYCLE SAM TEMC   S0   S1   S2',
     X '   S3 MARK BATV COM0 COM1 COM2 COM3 CMAVE  S0 ALT  S1 ALT',
     X'  S2 ALT  S3 ALT    SZA'/)
 2010 FORMAT (1X,13('********* '),'**')
 2020 FORMAT (/,1X,42X,'PROGRAM:  MERGE     UPDATED NOV, 1983'/)
 2030 FORMAT (/,1X,42X,'TAPE INFO:     NAME     UNIT     FILE#',/)
 2040 FORMAT (1X,46X,A8,2X,6A1,5X,I2,8X,I2)
 2050 FORMAT (/)
 2060 FORMAT (/,1X,2X,'LAUNCH SITE   RH    RM    RS    RACOR    DD',
     1    '      DM    DS    DECOR    SH    SM    SS    HOUR    RESTR',
     2 ' FLIGHT DATE AND TIME',/)
 2070 FORMAT (1X,1X,A8,3X,2F7.2,F6.2,F7.2,F8.2,2F6.2,F8.2,F7.2,
     1   2F6.2,F7.2,F9.2,30A1)
 2090 FORMAT (/,1X,16X,'BEG. RECORD     # BAD RECORDS START     END',/)
```

```
 2095 FORMAT((50Y,2F10.1)/)
 2550 FORMAT(1X,'MAIN 2550: CONFLICT IN FLIGHT NUMBERS',4X,'RADAR FLT ',
     1 F5.1,5X,'EDIT FLT ',F5.1)
 2560 FORMAT(1X,'MAIN 2560: RADAR PEDIGREE MISSING FROM REC 1 OF RADAR',
     1' TAPE')
 2570 FORMAT(1X,'MAIN 2570: EDIT PEDIGREE MISSING FROM REC 1 OF EDIT',
     1' TAPE')
 2580 FORMAT(1X,'MAIN 2580: ERROR IN READING RADAR PEDIGREE')
 2590 FORMAT(1X,'MAIN 2590: ERROR IN READING EDIT PEDIGREE')
 2910 FORMAT(1X,'MAIN 2910: READ ERROR AFTER RADAR RECORD NO:',I5)
 2920 FORMAT(1X,'MAIN 2920: END OF FILE ON EDIT OZONE TAPE.')
 2930 FORMAT(1X,' MAIN 2930: READ ERROR ON EDIT OZONE TAPE.')
 2940 FORMAT(1X,'MAIN 2940: TM TIME,',F11.3,', IS GT LAST RADAR TIME'
     1, F11.3,10X,'STOP PROCESSING')
 2999 FORMAT(1X, 'MAIN 2999: NUMBER OF RECORDS ON MERGE TAPE IS',I7)
 3000 FORMAT (1X,19X,I3,15X,I3)
      END
C
C
C*********************************************************************
C      SUBROUTINE ZENITH                   6/10/80
```

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```
C       PROGRAMMER:       EUGENE H. SHAFFER/SASC
C         LON = DEG. E; DD=DH                        S. COOKE    11/83
C
C       PURPOSE:
C           TO COMPUTE THE ZENITH ANGLE GIVEN ALL NECESSARY
C           EPHEMERIS DATA, LATITUDE, AND LONGITUDE.
C
C       CALLING SEQUENCE:
C          CALL ZENITH (LONO,LATO)
C
C   REED/BATLUCK 11-82 :ADDED LAT DEPENDENT EARTH RADIUS
C   COOKE        11-83 :ADDED MODE
C*************************************************************************
C
C       VARIABLES:
C            NAME           TYPE  I/O  DESCRIPTION
C            ----           ----  ---  -----------
C        INTERNAL
C            DECU           R*4    O   DECLINATION TIME
C            DECORR         R*4    O   DECLINATION CORRECTION
C            LATO           R*4    I   LATITUDE OF LAUNCH SITE - DEG. E
C            LONO           R*4    I   LONGITUDE OF LAUNCH SITE - DEG. N
C            MODE           I*4    I   IF MODE = 2, RNS AND REW ARE DEG.
C            RO             R*4    I   RADIUS OF EARTH
C            R1             R*4    I   ANGLE CONVERSION
C            RAU            R*4    O   RIGHT ASCENSION TIME - HOURS
C            RACORR         R*4    O   RIGHT ASCENSION CORRECTION -SECONDS
C            SIDT           R*4    O   SIDEREAL TIME - HOURS
C        COMMON/Z/
C            DD,DM,DS,DECOR R*4    I   EPHEMERIS DATA: DECLINATION, DEG.
C            RH,RM,RS,RACOR R*4    I   EPHEMERIS DATA: RIGHT ASCENSION, HR
C            SH,SM,SS        R*4   I   EPHEMERIS DATA: SIDEREAL TIME, HR
C            SOLARZ          R*4   O   ZENITH ANGLE
C
C**************************************************************************
C
      SUBROUTINE ZENITH (LONO,LATO,MODE)
      REAL LAT,LATO,LON,LONO,LATR
      DIMENSION RAD2(4)
      COMMON /Z/RH,RM,RS,RACOR,DD,DM,DS,DECOR,
     *SH,SM,SS,GMT,REW,RNS,SOLARZ
C
      RAU=RH+RM/60.+RS/3600.
      RACORR=RACOR/3600.
      DECU=DD+DM/60.+DS/3600.
      IF(DD.LT.0)DECU=DD-DM/60.-DS/3600.
      DECORR=DECOR/3600.
      SIDT=SH+SM/60.+SS/3600.
C
C     LATITUDE AND LONGITUDE OF LAUNCH SITE
C
      C  =57.29578
      R1=1.0/C
      R0=6.371E6
      LATR=LATO*R1
      IF (MODE .EQ. 2) GO TO 200
C
```

```
C FORMULA FROM BASIC PHYSICS OF THE SOLAR SYSTEM
C BLANCO & MCCUSKEY, 1961 PAGE 83
      R0=6378388.*(1-3.367E-03*(SIN(LATR))**2+7.1E-06*(SIN(2.*LATR))**2)
C     DEGREE-RAD CONVERSION, EARTH RADIUS (M)
C     INSTANTANEOUS TIME AND RANGE EAST-WEST AND NORTH-SOUTH
C
      LAT=LAT0+C*RNS/R0
      LON=LON0+C*REW/(R0*COS(LAT0*R1))
   20 LON=LON/15.
C
C     CONVERT DEGREES TO HOURS  360DEG/24HR
C
      DEC=DECU+(GMT*DECORR)/24.
      RA=RAU+(GMT*RACORR)/24.
      DL=0.5*R1*(LAT-DEC)
      SL=0.5*R1*(LAT+DEC)
      BD=7.5*R1*(1.00273*GMT+SIDT-RA+LON)
C
C     1.0027379 = SOLAR DAY/SIDEREAL DAY
C
      F1=COS(BD)*SIN(DL)
```

```
      E1=SIN(BD)*COS(SL)
      HM=ATAN2(F1,E1)
      F2=COS(BD)*COS(DL)
      E2=SIN(BD)*SIN(SL)
      HP=ATAN2(F2,E2)
      F3=SIN(HP)*TAN(DL)
      E3=SIN(HM)
      ZA=2.0*ATAN2(F3,E3)*C
      IF(ZA.LT.0.) ZA=ZA+360.0
      SOLARZ=ZA
      GO TO 999
  200 LAT = RNS
      LON = REW
      GO TO 20
  999 RETURN
      END
C
C
C*******************************************************************
C       FUNCTION AITKEN                          6/10/80
C       PROGRAMMER:     EUGENE H. SHAFFER/SASC
C
C       PURPOSE:
C           A FOUR POINT INTERPOLATION SCHEME USING THE
C             AITKEN INTERPOLATION METHOD.
C
C       CALLING SEQUENCE:
C          AITKEN (X,Y,XHAT,N)
C
C*******************************************************************
C
C       VARIABLES:
C            NAME           TYPE  I/O  DESCRIPTION
C            ----           ----  ---  -----------
C        INTERNAL
C            X(4)           R*4    I   X-VALUES FOR INTERPOLATION
C            XHAT           R*4    I   X-VALUE FOR WHICH Y IS TO BE COMPUT
C            Y(4)           R*4    I   Y-VALUES FOR INTERPOLATION
C            YAIK(4)        R*4    O   COMPUTED Y-VALUE
C
C********************************************************************
C
      FUNCTION AITKEN(X,Y,XHAT,N)
      DIMENSION XAIK(4),YAIK(4),X(4),Y(4)
      DO 10 I=1,N
      XAIK(I)= XHAT-X(I)
   10 YAIK(I)=Y(I)
      DO 20 I=2,N
      DO 20 J=I,N
C     IF ((XAIK(J) - XAIK(I-1)) .LE. 0.) WRITE(6,2010) J,I,N,
C    X          XAIK(I),XHAT,X(I),XAIK(J),XAIK(I-1)
 2010 FORMAT(' TEST AITKEN 2010: J=',I2,' I=',I2,' N=',I2,' XAIK(I)=',
     X F10.3,' XHAT=',F10.3,' X(I)=',F10.3,' XAIK(J)=',F10.3,
     X ' XAIK(I-1)=',F10.3)
      YAIK(J)=(XAIK(J)*YAIK(I-1)-XAIK(I-1)*YAIK(J))/(XAIK(J)-XAIK(I-1))
   20 CONTINUE
      AITKEN=YAIK(N)
```

```
      RETURN
      END
C
C ***********************************************************************
C
      SUBROUTINE RADAR2(RAD2,T1,H1,S,W,STIME,N,IUNIT2)
C
C COOKE                       11/83
C
C RADAR2 READS IN THE INPUT DATA FROM 9 TRACK ECLIPSE PASS1 TAPES
C (MODE 2). IN THIS CASE, THE RADAR TAPE SUPPLIED BY WALLOPS IS
C USED DIRECTLY IN THE MERGE PROGRAM RATHER THAN USING A INTER-
C MEDIATE REFORMATTED RADAR TAPE.
C
      DIMENSION T1(3000),H1(3000),S(3000),W(3000)
      REAL*8 RAD2(4)
C
C INITIALIZE VARIABLES AND ARRAYS
      T1(1) = 0.
      CALL CMOVE(T1(1),T1(2),11996)
      CALL CMOVE(T1(1),H1(1),12000)
```

```
      CALL CMOVE(T1(1),S(1),12000)
      CALL CMOVE(T1(1),W(1),12000)
      N = 0
C READ IN RADAR DATA UP TO 3000 RECORDS.
      DO 100 I = 1,3000
        CALL FREAD(RAD2(1),IUNIT2,32,*999,*200)
C TEST FOR INVALID ALTITUDE. IF ALTITUDE INVALID, SKIP RECORD.
        IF (N.GE.1 .AND. (ABS(H1(N)-RAD2(2)).GT. 5000.)) GO TO 100
        N = N + 1
        T1(N) = RAD2(1) + STIME
C TEST FOR DUPLICATE TIMES FROM RADAR TAPE. IF SO, SKIP RECORD.
        IF (N.GT.1 .AND.(T1(N).EQ.T1(N-1))) GO TO 90
        H1(N) = RAD2(2)
        S(N)  = RAD2(3)
        W(N)  = RAD2(4)
        GO TO 100
   90   N = N - 1
  100   CONTINUE
      GO TO 999
  200 WRITE(6,2200) I
 2200 FORMAT(/,1X,'RADAR2 2200: READ ERROR ON INPUT RADAR TAPE AFTER',
     X' RECORD ',I5,2X,'PROCESSING CONTINUING')
      GO TO 100
  999 RETURN
      END
C **********************************************************************
C
      SUBROUTINE TMPAVE(ERD)
C
C  PROGRAMMERS:   E. REED, S. COOKE                    NOV 1983
C                 S. COOKE     ADDED TO MERGE PGM      FEB 1984
C
C  FOR ALTITUDES LESS THAN 45KM AND S3 LESS THAN 100 COUNTS, TMPAVE
C  OBTAINS THE AVERAGE COUNTS FOR S1, S2, AND S3 AS A FUNCTION OF
C  TEMPERATURE IN 0.5 DEGREE INCREMENTS, BETWEEN 40 AND -10 C.
C
      REAL*8 SUM
      DIMENSION ERD(20), TMP(100)
      COMMON/TEMPER/ NUM(100,3),SUM(100,3),TOP(100,3),BOT(100,3)
      DATA INIT/0/
C
C
      TIN = ERD(4)
      S3  = ERD(8)
      ALT = ERD(16)
      IF (INIT .NE. 0) GO TO 20
      NUM(1,1) = 0
      CALL CMOVE (NUM(1,1),NUM(2,1),5996)
      DO 10 I = 1,100
      TMP(I) = 40. - 0.5*I
      BOT(I,1) = 1000.
      BOT(I,2) = 1000.
   10 BOT(I,3) = 1000.
      INIT = 1
C INITIALIZATION COMPLETED
C
   20 IF (S3.GT.100. .OR. ALT.GT.45000. .OR. TIN.GT.39.74 .OR.
```

```
     X  TIN.LT.-10.24) GO TO 990
      IT = INT(80. - 2.*TIN)
      DO 50 J = 1,3
        CT = ERD(J+5)
        IF (CT .LT. 0.) GO TO 50
        NUM(IT,J) = NUM(IT,J) + 1
        SUM(IT,J) = SUM(IT,J) + CT
        IF (CT .GT. TOP(IT,J)) TOP(IT,J) = CT
        IF (CT .LT. BOT(IT,J)) BOT(IT,J) = CT
   50   CONTINUE
      GO TO 990
C
C DISPLAY CONTENTS OF ARRAYS.
      ENTRY PRINTM
      WRITE (6,2050)
 2050 FORMAT(//,1X,'DEG C   S1AVE  MAX   MIN    N     S2AVE   MAX    ',
     X 'MIN    N      S3AVE  MAX  MIN    N',/)
      DO 100 I = 1,100
        S1 = 0.
        S2 = 0.
        S3 = 0.
```

```
      N1 = NUM(I,1)
      N2 = NUM(I,2)
      N3 = NUM(I,3)
C FIND AVG. COUNT FOR S1. IF MORE THAN 6 VALUES FOR S1, ELIMINATE
C HIGHEST AND LOWEST BEFORE FIGURING AVERAGE. IF NO VALUES EXIST FOR S2
C FOR THIS TEMP. LEVEL, GO ON TO CALCULATE S2 AVG.
      IF (N1.EQ.0 .AND. N2.EQ.0 .AND. N3.EQ.0) GO TO 100
      IF (N1 .EQ. 0) GO TO 60
      IF (N1 .GT. 6) GO TO 55
      S1 = SUM(I,1)/N1
      GO TO 60
   55 S1 = (SUM(I,1) - TOP(I,1) - BOT(I,1))/(N1 - 2)
C FIND AVG. COUNT FOR S2. IF MORE THAN 6 VALUES FOR S2 FOR THIS TEMP.
C LEVEL, ELIMINATE HIGHEST AND LOWEST BEFORE FINDING AVG. IF NO VALUES
C EXIST FOR THIS LEVEL, GO ON TO CALCULATE S3 AVG.
   60 IF (N2 .EQ. 0) GO TO 70
      IF (N2 .GT. 6) GO TO 65
      S2 = SUM(I,2)/N2
      GO TO 70
   65 S2 = (SUM(I,2) - TOP(I,2) - BOT(I,2))/(N2 - 2)
C FIND AVG. COUNT FOR S3. IF MORE THAN 6 VALUES FOR S3 FOR THIS
C TEMPERATURE LEVEL, DISCARD HIGHEST AND LOWEST BEFORE CALCULATING
C AVG. IF NO VALUES EXIST, PRINT LINE AND GO ON TO NEXT TEMP. INCREMENT.
   70 IF (N3 .EQ. 0) GO TO 80
      IF (N3 .GT. 6) GO TO 75
      S3 = SUM(I,3)/N3
      GO TO 80
   75 S3 = (SUM(I,3) - TOP(I,3) - BOT(I,3))/(N3 - 2)
C PRINT LINE
   80 WRITE(6,2080) TMP(I),S1,TOP(I,1),BOT(I,1),N1,S2,TOP(I,2),
     X   BOT(I,2),N2,S3,TOP(I,3),BOT(I,3),N3
 2080 FORMAT(1X,F5.1,F8.3,2F6.1,I5,F10.3,2F6.1,I5,F10.3,2F5.1,I5)
  100 CONTINUE
  990 RETURN
      END
```

*** END OF MEMBER ***   658 RECORDS PROCESSED   **

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```
C***********************************************************************
C
C       SMOOTH SIGNAL PROGRAM          6/26/80
C       EDITION:    1
C          LANGUAGE:    FORTRAN
C          COMPUTER:    IBM 360/75, 360/91,    3081
C          OPERATING SYSTEM:  G. S. F. C.
C       PROGRAMMER:     EUGENE H. SHAFFER/SASC
C       REVISED: REED/BATLUCK                                     12/82
C                COOKE  ADDED PEDIGREE                            03/83
C                  "    ADDED TEMP DEPENDENT ZERO OFFSET,S2,S3    06/83
C                  "    ADDED MIN VALUE FOR COMPWRD                 "
C                  "    ADDED AVE COMP CHANNEL VALUE                "
C                  "    ADDED MINIMUM COUNT VALUE (2 CNTS)        11/83
C                  "    ADDED ISKIP TO SKIP BAD MERGE RECORDS     05/84
C
C       PURPOSE:
C            A PROGRAM TO READ THE MERGED SIGNAL AND RADAR DATA
C            AND TO SMOOTH THE DATA TO OBTAIN A SIGNAL VALUE FOR
C            EACH FILTER AT EVERY WHOLE KILOMETER LEVEL OVER THE
C            ENTIRE RANGE OF THE DATA.
C
C            THE INITIAL VERSION EVALUATED ERRORS AS DUE ONLY TO A
C            FIXED COUNT (E.G. DIGITIZATION ERROR), AND CARRIED THE
C            ESTIMATES IN E AND ER. THE 1982/3 VERSION ESTIMATES ERROR
C            AS DUE TO RANDOM NOISE AND OBTAINS ITS MAGNITUDE FROM THE
C            FIT OF POINTS TO THE LINE GENERATED IN LOGFIT.
C
C*********************************************************************
C
C      VARIABLES:
C           NAME            TYPE  I/O  DESCRIPTION
C           ----            ----  ---  -----------
C       INTERNAL
C           COMPMN           R*4   I   MIN ACCEPTABLE VALUE OF COMP WORD
C           E(300)           R*4   I   ERROR FOR EACH PT. OF FIT
C           HLOW             R*4   I   LOWEST HEIGHT OF DATA
C           HTOP             R*4   I   HIGHEST HEIGHT OF DATA
C           ICODE            I*4   O   END OF DATA INDICATOR
C           IRAT,LRAT        I*4   I   0: NO RATIOS; 1: S1/S0,S2/S0,S3/S0
C           ISKIP            I*4   I   # OF BAD MERGE RECS TO BE SKIPPED
C           IUNIT            I*4   I   INPUT TAPE UNIT NUMBER
C           IUNIT2           I*4   I   OUTPUT TAPE UNIT NUMBER
C           JK               I*4   O   NUMBER OF HEIGHT INTERVALS
C           LEN              I*4   I   LRECL OF INPUT TAPE
C           MODE             I*4   I   =1 INSTRUM,=0 NONE,=-1 STAT
C           NF               I*4   I   FILE NUMBER OF INPUT TAPE
C           NF2              I*4   I   FILE NUMBER OF OUTPUT TAPE
C           NR               I*4  I/O  NUMBER OF INPUT RECORDS
C           OFF              R*4   I   OFFSETS FOR CHANS 0-3
C           PLOTX(50)        R*4   I   ARRAY FOR X-VALUES OF PLOTS
C           PLOTY(50)        R*4   I   ARRAY FOR Y-VALUES OF PLOTS
C           RESULT(20)       R*4  I/O  OUTPUT FOR 1 LEVEL FOR 1 FILTER
C           TAPEIN(6)        L*1   I   INPUT TAPE NAME
C           TAPOUT(6)        L*1   I   OUTPUT TAPE NAME
C           X(800)           R*4  I/O  X-VALUES FOR FITTING INTERVAL(M)
```

```
C          XCEN            R*4    I    X CENTER FOR FITTING INTERVAL(KM)   00000440
C          Y(800)          R*4   I/O   Y-VALUES FOR FITTING INTERVAL       00000450
C          YCEN            R*4    O    Y CENTER FOR FITTING INTERVAL       00000460
C     COMMON/LABEL1/                                                       00000470
C          ER(4,800)       R*4    I    ERRORS FOR ALL HEIGHT LEVELS        00000480
C          H(4,800)        R*4    I    HEIGHTS FOR ALL LEVELS (KM)         00000490
C          N               I*4    I    NUMBER OF PTS IN FITTING INTERVAL   00000500
C          (  800)         R*4   I/O   TELEMETRY SIGNAL VALUES             00000510
C          ( J)            R*4    I    AVE COMP CHANNEL VALUES             00000512
C     COMM  LABEL2/                                                        00000520
C          SAVE(20,50,4)   R*4    O    OUTPUT ARRAY                        00000530
C                                                                          00000535
C  RESULT, THE OUTPUT ARRAY                                                00000540
C    1 FILTER POSITION                     11 START OF INTERVAL            00000550
C    2 ALTITUDE LEVEL (XCEN)               12 END OF INTERVAL              00000560
C    3 SIGNAL AT XCEN=I=EXP(A+B*DH)        13 NUMBER OF POINTS USED        00000570
C    4 SLOPE = B*SIGNAL AT XCEN            14 ESTIMATED SIG AT BASE EXP(A)00000580
C    5 SOLAR ZENITH ANGLE AT XCEN          15 STD. DEV. OF LN A            00000590
C    6 TIME AT XCEN                        16 ESTIMATED ABSORP AND SCATT 00000600
C    7 TEMPERATURE OF INSTRUMENT           17 STD. DEV. OF B               00000610
C    8 AVE LENGTH OF CYCLE                 18  "    " (FIT TO CURVE),COUNTS00000620
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C    9 BATTERY VOLTAGE                      19 CORRELATION COEFFICIENT
C   10 AVERAGE COMPENSATION WORD            20 NUMBER OF POINTS INITIALLY
C*******************************************************************
C
C      SUBROUTINES CALLED
C         GRAPH       DWRITE      CALSIZ      CMOVE
C         LOGFIT      FREAD       ENDPLT      RPDATO
C         OUTPUT      FWRITE      PLOTST
C         SELECT      MOUNT
C
C********************************************************************
C
      LOGICAL*1 TAPEIN(6),TAPOUT(6)
      DIMENSION PLOTX(50),PLOTY(50),X(800),Y(800),E(800),
     X OFF(4),RESULT(20),R(20),PED(20),IYMD(3)
      COMMON/LABEL1/ N,S(4,800),H(4,800),ER(4,800)
      COMMON/LABEL2/SAVE(20,50,4)
C
      IMES = 6
      CALL CALSIZ(12.)
      CALL PLOTST(02001,4)
C
C  READ INPUT INFORMATION.
      READ (5,1000) TAPEIN,NF,IUNIT
      READ (5,1000) TAPOUT,NF2,IUNIT2
      READ (5,1005) MODE,LRAT
C COMPMN IS GENERALLY SET TO 0.5*COMP WORD AFTER ATTITUDE IS STABLE.
C IN CASES WHERE SZA IS AROUND 60 DEGREES, COMPMN =
C   COS(SZA) * MAX COMP WORD.
      READ (5,1010) HTOP,HLOW,COMPMN,ISKIP
C TA IS TEMP (DEG. C) FOR VALUES IN OFF; TB IS TEMP FOR S2 AND S3 ZERO
C OFFSETS GIVEN IN S2B AND S3B.
      READ (5,1030) OFF
      READ (5,1030) TA,TB,S2B,S3B
C
C  MOUNT TAPES; READ AND WRITE RADAR,EDIT, AND MERGE PEDIGREES
C  FROM MERGE TAPE ONTO OUTPUT TAPE.
      CALL MOUNT (1,IUNIT,TAPEIN,NF)
      CALL MOUNT (2,IUNIT2,TAPOUT,NF2)
      CALL FREAD(PED,IUNIT,LEN)
      CALL FWRITE(PED,IUNIT2,80)
      CALL FREAD(PED,IUNIT,LEN)
      CALL FWRITE(PED,IUNIT2,80)
      CALL FREAD(PED,IUNIT,LEN)
      CALL FWRITE(PED,IUNIT2,80)
C
C  ESTABLISH SMOOTH PEDIGREE. PRINT OUT PEDIGREE AND INPUT INFORMATION;
C  WRITE SMOOTH PEDIGREE ONTO OUTPUT TAPE.
      PED(1) = -400.
      READ (5,1040) PED(2)
      CALL RPDATO(1,IYMD)
      PED(3) = IYMD(2) * 10000 + IYMD(3) * 100 + IYMD(1)
      PED(4) = OFF(1)
      PED(5) = OFF(2)
      PED(6) = OFF(3)
      PED(7) = OFF(4)
      PED(8) = HTOP
```

```
      PED(9) = HLOW
      PED(10)= COMPMN
      PED(11)= TA
      PED(12)= TB
      PED(13)= S2B
      PED(14)= S3B
      DO 2  I = 15,20
         PED(I) = 0.0
    2    CONTINUE
      WRITE (6,2035)
      WRITE (6,2040) PED(1),PED(2),PED(3)
      CALL FWRITE(PED,IUNIT2,80)
      WRITE (6,2000) TAPEIN,NF,IUNIT
      WRITE (6,2010) TAPOUT,NF2,IUNIT2
      WRITE (6,2020) HTOP,HLOW,LRAT,MODE,COMPMN
      WRITE(6,2025) OFF,TA,TB,S2B,S3B
      HMAX = 1000.*HTOP + 500.
C
C
C  MOVE INPUT DATA TO DISC
      NR=0
```

```
      NRR=0
    3 CONTINUE
      CALL FREAD(R,10,LEN,&6,&3)
C SKIP MERGE RECORDS WITH INVALID TIME OR RECORDS WITH NEGATIVE OR
C ASCENDING ALTITUDES.
      NRR = NRR + 1
      IF (NRR.LE.ISKIP) GO TO 3
      NR=NR+1
      CALL DWRITE(3,NR,R)
      GO TO 3
    6 IF (NR .LT. 100.) GO TO 910
      IRAT = 0
      RESULT(2) = 0.
   10 JK=1
      XCEN=HTOP+1.0
C  ASSUME DESCENDING SONDE
   12 XCEN=XCEN-1.0
      IF(XCEN.LT.HLOW) GO TO 25
C
C  SELECT FITTING INTERVALS AND SMOOTH THE DATA
C
      ICODE = 0
      CALL SELECT(XCEN,NR,ICODE,OFF,TA,TB,S2B,S3B,COMPMN,IRAT,RESULT,
     X     HMAX)
      IF(ICODE.EQ.-1) GO TO 12
      IF (ICODE .EQ. -2) GO TO 25
   13 CONTINUE
      DO 20 I=1,4
      DO 15 J=1,N
      X(J)=H(I,J)
      Y(J)=S(I,J)
      E(J)=ER(I,J)
   15 CONTINUE
      RESULT(1) = I-1
      IF(IRAT.EQ.1) RESULT(1) = 10.*RESULT(1)
      RESULT(2) = XCEN
      RESULT(13) = N
      CALL LOGFIT(X,Y,E,RESULT,MODE)
      CALL CMOVE(RESULT(1),SAVE(1,JK,I),80)
   20 CONTINUE
      JK=JK+1
      IF(JK.LT.51) GO TO 12
   25 JK=JK-1
C
C   CALL "OUTPUT" TO PRINT THE RESULTS.
C
      CALL OUTPUT (JK,IUNIT2)
      WRITE (6,2075)
C
C   PLOT THE SIGNAL DATA VERSUS HEIGHT.
C
      DO 800 IE=1,4
      I=5-IE
      DO 290 J=1,JK
      PLOTX(J)=SAVE(3,J,I)
      PLOTY(J)=SAVE(2,J,I)
  290 CONTINUE
```

```
      CALL GRAPH (PLOTX,PLOTY,JK,I,IRAT)
  800 CONTINUE
      IF(IRAT.EQ.1 .OR. LRAT.EQ.0) GO TO 900
      IRAT = 1
      GO TO 10
  900 CALL ENDPLT
      GO TO 999
C
C ODDS AND ENDS
  910 WRITE (IMES,2910) NR
 2910 FORMAT ('0MAIN 2910: NUMBER OF MERGE RECORDS IS ONLY ',I4)
 1000 FORMAT (6A1,3(2X,I2))
 1005 FORMAT (I2,42X,I1)
 1010 FORMAT (2(2X,F4.1),2X,F4.0,2X,I4)
 1030 FORMAT (4(F6.1,2X))
 1040 FORMAT (F4.0)
 2000 FORMAT (/////,1X,10X,'TAPE INFORMATION:      NAME      I/O',
     1   '       FILE      UNIT',//,1X,31X,6A1,3X,'INPUT',5X,I2,7X,I2)
 2010 FORMAT (1X,31X,6A1,3X,'OUTPUT',4X,I2,7X,I2)
 2020 FORMAT (///,1X,10X,'UPPER HEIGHT LIMIT:',F5.1,' KM',
     1   /,1X,10X,'LOWER HEIGHT LIMIT:',F5.1,' KM',10X,'RATIOS=',I2,
```

```
     X ' MODE=',I2,/,11X,'MINIMUM ACCEPTABLE COMPENSATION WORD = ',
     X F6.1,/)
 2025 FORMAT (1X,/,10X,' ZERO  OFF-SETS: S0    S1    S2    S3',
     1 10X,'TA    TB    S2B    S3B',
     1   /,1X,25X,F4.1,1X,F4.1,1X,F4.1,1X,F4.1,8X,3(F4.1,1X),1X,F4.1)
 2035 FORMAT (///,1X,20X,'FLT. NO.',5X,'RUN DATE')
 2040 FORMAT (//,1X,10X,F5.0,6X,F4.0,8X,F7.0)
 2075 FORMAT (//,1X,132('*'))
  999 WRITE (IMES,2999)
 2999 FORMAT ('0MAIN 2999:  PROGRAM END')
      STOP
      END
C*******************************************************************
C      SUBROUTINE GRAPH                      7/01/80
C      PROGRAMMER:     EUGENE H. SHAFFER/SASC
C        REVISED:        REED/BATLUCK                        DEC. 1982
C
C      PURPOSE:
C          TO PRODUCE A CAL-COMP PLOT OF THE SMOOTHED
C          SIGNAL VALUES VERSUS HEIGHT.
C
C      CALLING SEQUENCE:
C         GRAPH  (X,Y,N,I,IRAT)
C
C*******************************************************************
C
C      VARIABLES:
C           NAME          TYPE  I/O  DESCRIPTION
C           ----          ----  ---  -----------
C       ARGUMENTS
C           I             I*4    I   FILTER NUMBER (1-4)
C           IRAT          I*4    I   INDICATOR FOR X COORDINATES
C           N             I*4    I   NUMBER OF POINTS TO BE PLOTTED
C           X(N)          R*4    I   X-AXIS DATA
C           Y(N)          R*4    I   Y-AXIS DATA
C       INTERNAL
C           (NONE)
C
C********************************************************************
C
C      SUBROUTINES CALLED
C           FRMADV
C           HORLIN
C           GRAPH
C           OGRID
C           SETGRD
C           VERLIN
C
C*********************************************************************
C
C
      SUBROUTINE GRAPH (X,Y,N,I,IRAT)
      LOGICAL*1 LF(4)
      DIMENSION X(N),Y(N)
      DATA LF/'0','1','2','3'/
C
C   SET UP PLOT AND GRID
```

ORIGINAL PAGE IS
OF POOR QUALITY

```
C
      CALL SETGRD (1.,1.,10.,8.,4)
      IF(I.EQ.1)CALL OGRID (0.0,1000.,50,'F6.1)',5,0.,75.,75,'I2)',5,0)
      IF(I.GT.1 .AND. IRAT.EQ.1)CALL OGRID(-0.1,1.5,16,'F3.1)',1,0.,75.,
     *   75,'I2)',5,0)
      IF(I.GT.1.AND.IRAT.EQ.0)CALL OGRID(-100.,1000.,55,'I4)',5,0.,75.,
     *   75,'I2)',5,0)
C
C   WRITE GRAPH HEADINGS
C
      CALL HORLIN ('UV SIGNAL S',11,5.5,0.5,0,0)
      CALL HORLIN(LF(I),1,5.5,0.5,13,0)
      IF(I.GT.1.AND.IRAT.EQ.1)  CALL HORLIN('DIVIDED BY S0',
     X 13,5.5,0.5,30,0)
      CALL VERLIN ('HEIGHT (KM)',-11,0.5,4.5,0,0)
C
C   PLOT DATA
C
      CALL PLOT (X,Y,N,'+')
      CALL FRMADV
      RETURN
```

```
      END
C*****************************************************************
C      SUBROUTINE SELECT                   7/01/80
C      PROGRAMMER:     EUGENE H. SHAFFER/SASC
C       REVISED:        REED/BATLUCK/COOKE        DEC 82 - JUN 83
C
C      PURPOSE:
C         TO SELECT ALL DATA POINTS CENTERED AROUND A GIVEN
C         HEIGHT, AT LEAST A ONE KILOMETER INTERVAL OR 100
C         POINTS MUST MAKE UP THE SELECTED DATA.
C
C         AVERAGE VALUES OF CYCLE LENGTH AND COMPENSATION CHANNEL
C         ARE COMPUTED BASED ON 99 RECORDS CENTERED ON XCEN.
C
C*****************************************************************
C
C      VARIABLES:
C           NAME           TYPE  I/O  DESCRIPTION
C           ----           ----  ---  -----------
C       ARGUMENTS
C           COMPMN          R*4   I   MIN ACCEPTABLE COMP WORD
C           HMAX            R*4   I   MAX ALTITUDE(M) FOR ACCEPTABLE DATA
C           ICODE           I*4  I/O  INDICATOR FOR END OF DATA
C           IRAT            I*4   I   INDICATOR FOR USING RATIOS
C           NREC            I*4   I   NUMBER OF RECORDS ON DISK
C           OFF             R*4   I   OFF-SETS FOR ALL CHANNELS
C           RESULT          R*4  I/O  OUTPUT ARRAY
C           S2B             R*4   I   S2 OFFSET AT TEMP B
C           S3B             R*4   I   S3 OFFSET AT TEMP B
C           TA              R*4   I   TEMP (C) FOR OFF
C           TB              R*4   I   TEMP (C) FOR S2B AND S3B
C           XCEN            R*4   I   CENTER OF INTERVAL, KM
C      COMMON/LABEL1/
C           ER(4,800)       R*4   I   ERRORS FOR ALL HEIGHT LEVELS
C           H(4,800)        R*4   I   HEIGHTS FOR ALL LEVELS (KM)
C           N               I*4   I   NUMBER OF PTS IN FITTING INTERVAL
C           S(4,800)        R*4  I/O  TELEMETRY SIGNAL VALUES
C      INTERNAL
C           HB              R*4   O   LOWER HEIGHT OF INTERVAL (KM)
C           HT              R*4   O   UPPER HEIGHT OF INTERVAL (KM)
C           NB              I*4   O   LOW RECORD OF INTERVAL
C           NR              I*4   O   NUMBER OF RECORDS IN INTERVAL
C           NT              I*4   O   HIGH RECORD OF INTERVAL
C           R(20)           R*4   I   SIGNAL VALUES FROM MERGE TAPE
C
C*****************************************************************
C
C      SUBROUTINES CALLED
C           DREAD, CMOVE
C
C*****************************************************************
C
C
      SUBROUTINE SELECT(XCEN,NREC,ICODE,OFF,TA,TB,S2B,S3B,COMPMN,IRAT,
     X RESULT,HMAX)
      DIMENSION R(20),B(4),RESULT(20),OFF(4)
      COMMON/LABEL1/ N,S(4,800),H(4,800),ER(4,800)
```

```
C
C INITIALIZE
C
      IF (RESULT(2) .NE. 0.) GO TO 8
      B(1) = 0.
      CALL CMOVE(B(1),B(2),12)
      IF (TA .EQ. TB) GO TO 8
      B(3) = (S2B-OFF(3)) / (TB-TA)
      B(4) = (S3B-OFF(4)) / (TB-TA)
      SQRTH=SQRT(0.5)
    8 NR=0
      XC=XCEN*1000.
C
C    FIND CENTER POINT OF DATA, ASSUMING A DESCENDING SONDE
C
   10 CONTINUE
      NR=NR+1
      IF (NR .GT. NREC) GO TO 920
   11 CALL DREAD (3,NR,R,&10)
      IF(R(16).LT.XC) GO TO 12
      TMA=R(1)
```

```
      HTA=R(16)
      SZA=R(20)
      GO TO 10
   12 TMB=R(1)
      HTB=R(16)
      SZB=R(20)
      FRAC=(XC-HTB)/(HTA-HTB)
      RESULT(5)=SZB+FRAC*(SZA-SZB)
      RESULT(6)=TMB+FRAC*(TMA-TMB)
      RESULT(7) = R(4)
      RESULT(9) = R(10)
   15 NT=NR-50
      NB=NR+49
      NX = NR
      IF (NT .LE. 0) NB=100
      IF (NT .LE. 0) NT=1
      IF (NB .GT. NREC) NB=NREC
      IF (NB .GE. NREC) NT=NREC-100
C
C    FIND ALL DATA AROUND CENTER HEIGHT
C
   16 CONTINUE
      CALL DREAD (3,NT,R,&16)
      HT=R(16)/1000.
      CALL DREAD (3,NB,R,&16)
      HB=R(16)/1000.
      IF ((HT-HB).GE.2.0 .OR. (NB-NT).GT.800) GO TO 18
      NT=NT-5
      NB=NB+5
      IF (NT .LE. 0) NT=1
      IF (NB .GE. NREC) NB=NREC
      GO TO 16
   18 CONTINUE
      N=0
      J=0
      COMP = 0.0
      CYCLE = 0.0
C
C    SELECT SIGNALS, AND HEIGHTS FOR THE INTERVAL. COMPUTE ERROR
C    CALCULATE RATIOS IF REQUESTED (IRAT=1)
C
      DO 200 I=NT,NB
      CALL DREAD(3,I,R,&200)
      IF (R(16) .GT. HMAX) GO TO 200
      N=N+1
      IF(N.GT.800) GO TO 910
      IF (IABS(I-NX) .GT. 49) GO TO 50
      J = J+1
      COMP = COMP + R(15)
      CYCLE = CYCLE + R(2)
   50 DO 150 K=1,4
      KF=K+4
      S(K,N) = R(KF)-OFF(K)-B(1) * (R(7)-TA)
      IF (R(KF) .LT. 2.0) S(K,N) = -99.
      IF (R(K+10).LE.COMPMN) S(K,N) = -99.
C   DEFINE ERROR AS SQRT(.5/R)**2+(.5/R)**2 ,I.E.=SQRT(0.5)/R
      ER(K,N)=SQRTH
```

```
      IF(IRAT.EQ.1) GO TO 100
      IF(R(KF).GT.1.0)  ER(K,N) = SQRTH/R(KF)
      GO TO 120
C  IF RATIOS ARE REQUESTED DIVIDE S1,S2,S3 BY S0 AND COMPUTE ERROR
  100 IF(K.EQ.1) GO TO 120
      IF(R(5).LT.0.) GO TO 160
      DENOM = S(1,N)
      IF(ABS(DENOM).LT.0.5) GO TO 160
      IF(R(KF).LT.2.0 .OR. S(K,N).LT.-90.) GO TO 110
      S(K,N)=S(K,N)/DENOM
      ER(K,N)=S(K,N)*0.5*SQRT(1/DENOM**2+1/DENOM**2)
      GO TO 120
  110 S(K,N) = -99.0
C  CORRESPONDING ALTITUDES IN KILOMETERS
  120 H(K,N)=R(K+15)/1000.
  150 CONTINUE
      GO TO 200
  160 N=N-1
  200 CONTINUE
      IF(N.LT.5) GO TO 900
C OBTAIN AVERAGE CYCLE LENGTH AND COMP WORD
```

```
      RESULT(8) = CYCLE/J
      RESULT(10)= COMP/J
      GO TO 999
C  INSUFFICIENT NUMBER OF VALID VALUES
  900 WRITE(6,2900) N,H(1,1),H(1,N),XC
 2900 FORMAT(1X,'SELECT 2900: ONLY ',I3,' POINTS BETWEEN',F6.2,' AND',
     X F6.2,' KM, CENTERED AT',F6.2,'.GO TO NEXT INTERVAL.')
      ICODE=-1
      GO TO 999
C  TOO MANY RECORDS IN HEIGHT INTERVAL
  910 WRITE(6,2910) H(1,1),H(1,800)
 2910 FORMAT(1X,'SELECT 2910: MORE THAN 800 CYCLES BETWEEN',
     X F7.2,' AND',F7.2,' KM.')
      GO TO 999
C XC IS BELOW LOWEST ALT OF DATA
  920 WRITE (6,2920) XC,R(16)
 2920 FORMAT (1X,'SELECT 2920: REQUESTED CENTER ALTITUDE,',F8.2,
     X',IS LESS THAN LOWEST ALTITUDE IN DATA,',F8.2)
      ICODE = -2
  999 RETURN
      END
C
C ***************************************************************************
      SUBROUTINE OUTPUT(N,IUNIT2)
C
C  REED/BATLUCK/COOKE           DEC 82 - JUN 83
C  ADDED COMP AND HTDIF COLUMNS          COOKE    NOV 1983
C
C ARGUMENTS
C   N       NUMBER OF HEIGHT LEVELS
C   IUNIT2 OUTPUT TAPE UNIT NUMBER
C
C ***************************************************************
      DIMENSION ARR(7), BRR(17)
      COMMON/LABEL2/SAVE(20,50,4)
      DATA LEN2/80/
C
C PRINT COMMON PARAMETERS
      WRITE(6,2000)
      DO 20 J = 1,N
      ARR(1) = SAVE(2,J,1)
      ARR(2) = SAVE(6,J,1)
      ARR(3) = SAVE(5,J,1)
      ARR(4) = SAVE(7,J,1)
      ARR(5) = SAVE(8,J,1)
      ARR(6) = SAVE(9,J,1)
      ARR(7) = SAVE(10,J,1)
      WRITE(6,2010)ARR
   20 CONTINUE
C PRINT DATA FOR EACH FILTER: S3,S2,S1 AND S0
C
      DO 50 KF = 1,4
      K=5-KF
      NFIL = SAVE(1,1,K)
      WRITE(6,2050) NFIL
      IF(NFIL.GT.5) WRITE(6,2051)
      WRITE(6,2060)
```

```
      DO 50 J = 1,N
      BRR(1)  = SAVE (2,J,K)
      BRR(2)  = SAVE (3,J,K)
      BRR(6)  = SAVE (11,J,K)
      BRR(7)  = SAVE (12,J,K)
      BRR(8)  = BRR(6) - BRR(7)
      BRR(9)  = SAVE (14,J,K)
      BRR(12) = SAVE (16,J,K)
      BRR(13) = SAVE (17,J,K)
      BRR(15) = SAVE (19,J,K)
      BRR(16) = SAVE (13,J,K)
      BRR(17) = SAVE (20,J,K)
      BRR(4)  = (EXP(SAVE (4,J,K)) - 1.) * 100.
      BRR(3)  = BRR(4) * BRR(2) * 0.01
      BRR(5)  = BRR(12) * BRR(2)
      BRR(11) = (EXP(SAVE(15,J,K)) - 1.) * 100.
      BRR(10) = BRR(11) * BRR(9) * 0.01
      BRR(14) = (SAVE(18,J,K) - 1.) * 100.
   50 WRITE(6,2070) BRR
C
C  WRITE DATA ON TAPE
```

```
      DO 100 K = 1,4
      DO 100 J = 1,N
  100 CALL FWRITE(SAVE(1,J,K),IUNIT2,LEN2)
      RETURN
 2000 FORMAT('0','ALT-KM SECONDS    SZA  TMP C  CYCLE BATTV COMP')
 2010 FORMAT (1X,F6.0,F8.1,F7.2,F7.1,F7.3,F6.2,F6.0)
 2050 FORMAT(//,1X,'FILTER POSITION',I3)
 2051 FORMAT('+',20X,' (DIVIDED BY S0)')
 2060 FORMAT (1X,' KM  CNT/RAT   STDCTS  STDx    SLOPE  START    END',
     X '    DIFF   BASEIO   STDCTS  STDx   ABSORP  DABSORP SETSDx',
     X ' COREL  USD  PTS')
 2070 FORMAT(1X, F3.0, F9.3, F9.4, F6.2, F9.4, F7.2, F7.2, F7.2, F9.3,
     X F9.4 ,F6.2 ,F9.4 ,F9.4 ,F7.2 ,F6.2 ,F5.0 ,F5.0)
      END
C
C ****************************************************************
      SUBROUTINE LOGFIT(H,S,E,RESULT,MODE)
C
C  REED/BATLUCK/COOKE          DEC 82 - JUN 83
C
C  LOGFIT FITS A CURVE OF THE FORM S=S0 EXP -C(H-H0 ) TO THE SIGNAL
C  VERSUS ALTITUDE DATA. THIS IS APPROXIMATED BY FITTING Y = A + BX
C  WHERE Y = LN S ,A=LN S0, B=-C,AND X =(H-H0). ( ALSO SEE P.R.BEVING-
C  TON, DATA REDUCTION..., MCGRAW-HILL 1969, PP 180-185,104-105.)
C  OUTLIERS (MORE THAN 2 S.D.) ARE DISCARDED.  PARAMETERS ARE PLACED
C  IN RESULT. IF MOST VALUES ARE .LE. 0, THE DATA ARE AVERAGED.
C
C ARGUMENTS
C  H        ALTITUDE
C  S        CORRESPONDING COUNTS OR RATIO
C  E        ERRORS DUE TO DIGITIZATION
C  RESULT   THE OUTPUT ARRAY
C
C  MODE      =1 INSTRUM-1./E**2  ; =2  NO WT; =-1 STAT. =1/Y(1)
C ****************************************************************
      REAL*8 SUM, SUMX, SUMY, SUMX2, SUMXY, SUMY2,
     X XI, YI, WEIGHT, DELTA, VARNCE
      DIMENSION H(1), S(1), E(1), RESULT(20),CTS(5),CTL(5),Y(5),DF(5)
C
      NOLD = 0
      NPTS = RESULT(13)
      HBASE = H(NPTS)
C ACCUMULATE WEIGHTED SUMS
  110 N = 0
      SUM=0.0
      SUMX = 0.0
      SUMY = 0.0
      SUMX2 = 0.0
      SUMXY = 0.0
      SUMY2 = 0.0
  210 DO 500 I = 1,NPTS
      YI= S(I)
      IF(YI.LE.0.0) GO TO 500
C ** TEST
C     WRITE(6,2210) I,NPTS,S(I),YI
 2210 FORMAT(1X,'LOGFIT 2210: I=',I3,1X,'NPTS=',I3,1X,'S(I)=',
     X G11.4,1X,'Y(I)=',G11.4)
```

```
      YI = DLOG(YI)
      XI = H(I)-HBASE
      IF(MODE) 310,360,380
  310 IF (YI) 340,360,320
  320 WEIGHT = 1./YI
      GO TO 410
  340 WEIGHT = 1./(-YI)
      GO TO 410
  360 WEIGHT = 1.
      GO TO 410
  380 WEIGHT = 1./E(I)**2
  410 N = N+1
      SUM = SUM + WEIGHT
      SUMX = SUMX + WEIGHT*XI
      SUMY = SUMY + WEIGHT*YI
      SUMX2 = SUMX2 + WEIGHT*XI*XI
      SUMXY = SUMXY + WEIGHT*XI*YI
      SUMY2 = SUMY2 + WEIGHT * YI*YI
  500 CONTINUE
C  CALCULATE COEFFICIENTS AND STANDARD DEVIATIONS
C
```

```
  510 DELTA = SUM*SUMX2-SUMX*SUMX
      IF(DABS(DELTA) .LT.1.0D-16) GO TO 700
      A = (SUMX2*SUMY-SUMX*SUMXY)/DELTA
  530 B = (SUMXY*SUM-SUMX*SUMY)/DELTA
  610 IF(MODE.EQ.0 .AND. N.GT.2) GO TO 640
      VARNCE = 1.
      GO TO 670
  640 C = N -2
      VARNCE = (SUMY2+A*A*SUM+B*B*SUMX2-2.*(A*SUMY+B*SUMXY-A*B*SUMX))/C
      IF (VARNCE .LE. 1.0D-16) GO TO 700
  670 SIGMAA = DSQRT(VARNCE*SUMX2/DELTA)
  680 SIGMAB = DSQRT(VARNCE*SUM/DELTA)
      R = (SUM*SUMXY - SUMX*SUMY)/DSQRT(DELTA*(SUM*SUMY2-SUMY*SUMY))
C SHAPE CHECKS RESIDUALS
C     IF(NOLD.NE.0.AND.A.GT.3.) CALL SHAPE(A,B,NPTS,H,S)
      IF(NOLD.NE.0) GO TO 800
C  DISCARD POINTS WHICH ARE MORE THAN 2 STD DEV AWAY.
C
      SD = DSQRT(VARNCE)
      SD2 = 2. * SD
      DO 690 I = 1,NPTS
        SI = S(I)
        IF (SI .LE. 0.) GO TO 690
C ** TEST
C     WRITE(6,2690) I,NPTS,S(I),SI
 2690 FORMAT(1X,'LOGFIT 2690: I=',I3,1X,'NPTS=',I3,1X,'S(I)=',G11.4,
     X 1X,'SI=',G11.4)
        TMP = A + B * (H(I)-HBASE)
        ERCT = ABS(SI - EXP(TMP))
        IF (SI.GT.2.0 .AND. ERCT.LT.2.0 + (SI/100.)) GO TO 690
        ERRR = ABS(ALOG(SI) - TMP)
        IF(ERRR .GT. SD2) S(I) = -99.
  690 CONTINUE
      NOLD = N
      IF(N.GT.(0.4*NPTS)) GO TO 110
C  TOO MANY NEGATIVE VALUES OR DELTA IS TOO SMALL; DO SIMPLE AVERAGES
  700 NOLD=0
  705 N = 0
      SUMY = 0.0
      SUMY2 = 0.0
      RMEAN = 0.0
      ND=0
      DO 720 I = 1,NPTS
      YI = S(I)
      IF(YI.LT.-50.0) GO TO 720
      IF (RESULT(1).GT.106. .AND. YI.LT.-0.2) GO TO 720
      N = N+1
      SUMY = SUMY+YI
      SUMY2 = SUMY2+YI*YI
  720 CONTINUE
      IF(N.EQ.0) GO TO 760
      RMEAN = SUMY/N
      IF(N.EQ.1) ND=1
      VARNCE = (SUMY2-(SUMY**2)/N)/(N-1+ND)
      IF(VARNCE.LE.0.0) GO TO 764
      SD = DSQRT(VARNCE)
      SD2 = 2. * SD
```

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```
      IF(NOLD.NE.0) GO TO 770
      DO 740 I = 1,NPTS
      IF(ABS(S(I)-RMEAN).LT.SD2) GO TO 740
      S(I) = -99.0
  740 CONTINUE
      NOLD = N
      GO TO 705
C  FILL OUTPUT ARRAY
  760 RESULT(3) = 0.
      GO TO 766
  764 RESULT(3) = RMEAN
  766 RESULT(18) = 0.
      GO TO 780
  770 RESULT(3) = RMEAN
      RESULT(18) = SD
  780 RESULT(4) = 0.
      RESULT(14)=0.0
      RESULT(15)=0.0
      RESULT(16)=0.0
      RESULT(17)=0.0
      RESULT(19)=0.0
```

```
      GO TO 820
  800 IF (N .GE. 0.5*NPTS) GO TO 815
      WRITE (6,2800) NPTS,NOLD,N,RESULT(1),RESULT(2),A,B,SD2
 2800 FORMAT (1X,'LOGFIT 2800: NPTS =',I4,' NOLD =',I4,' N =',I4,
     X' FP =',F4.0,' ALT =',F4.0,' A =',F8.4,' B =',F7.4,' TWO S.D. =',
     X F7.3/'  SI(CTS)  LNSI      Y    DIF')
      CALL DISPLA (NPTS,S,H,A,B,HBASE,SD2)
  815 RESULT(3) = EXP(A+B*(RESULT(2)-HBASE))
C ** TEST
C     WRITE(6,2815) SIGMAA,SIGMAB,RESULT(2),HBASE,A,B
 2815 FORMAT(1X,'LOGFIT 2815: SIGMAA=',G10.3,1X,'SIGMAB=',G10.3,1X,
     X 'RESULT(2)=',G10.3,1X,'HBASE=',G10.3,1X,'A=',G10.3,1X,'B=',G10.3)
      RESULT(4) = (SIGMAA*SIGMAA + SIGMAB*SIGMAB *
     X  (RESULT(2)-HBASE)**2.)**0.5
      RESULT(14) = EXP(A)
      RESULT(15) = SIGMAA
      RESULT(16) = -B
      RESULT(17) = SIGMAB
      RESULT(18) = EXP(SD)
      RESULT(19) = R
  820 RESULT(11) = H(1)
      RESULT(12) = HBASE
      RESULT(20) = RESULT(13)
      RESULT(13) = N
      RETURN
      END
C ************P***************************************************
      SUBROUTINE WOLFCR
C THIS REPLACES THE UNUSED ROUTINES OF MULTIPLOT FOR THE GERBER,SC4020,
C AND THE SD4060 PLOTTERS, REDUCING LENGTH BY 15.4K. REED/BATLUCK 12/82
      ENTRY GERBER
      GO TO 999
      ENTRY SC4020
      GO TO 999
      ENTRY SD4060
      GO TO 999
  999 RETURN
      END
      SUBROUTINE SHAPE(A,B,NPTS,H,S)
C REED/BATLUCK   JAN 1983
C
C SHAPE EXAMINES THE RESIDUALS RESULTING FROM THE FITTED CURVE TO LOOK
C FOR A NON-RANDOM DISTRIBUTION.  THE AVERGE DEVIATION IS COMPUTED AND
C  LISTED FOR 10 POINT GROUPS.
C
      DIMENSION H(1),S(1),AVE(80)
      N=0
      SUM=0
      K=0
      HBASE=H(NPTS)
      DO 200 I = 1,NPTS
      SI=S(I)
      IF(SI.LE.0.) GO TO 200
      E = SI-EXP(A+B*(H(I)-HBASE))
      SUM = SUM+E
      N = N+1
      IF(N.LT.10) GO TO 200
```

```
      K = K+1
      AVE(K) = SUM/N
      N = 0
      SUM = 0
  200 CONTINUE
      I = NPTS/2+1
      WRITE(6,2200) H(I),S(I),(AVE(N),N=1,K)
 2200 FORMAT(2X,(1X,26F5.0))
      RETURN
      END
C
C
C
C
      SUBROUTINE DISPLA (NPTS,S,H,A,B,HBASE,SD2)
C
C REED/BATLUCK/COOKE                    JUNE 1983
C
C DISPLA PRINTS OUT THE OBSERVED AND COMPUTED VALUES FO A GIVEN LEVEL.
C
      DIMENSION H(1),S(1),CTS(5),CTL(5),Y(5),DF(5)
```

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```
C
      DO 810 I = 1,NPTS
        K = I-1
        J = MOD(K,5) + 1
        CTS(J) = S(I)
        IF (S(I) .LE. .00001) GO TO 800
        CTL(J) = ALOG(S(I))
        Y(J)   = A + B * (H(I) - HBASE)
        DF(J)  = CTL(J) - Y(J)
        GO TO 805
  800   CTL(J) = 0.0
        Y(J)   = 0.0
        DF(J)  = 0.0
  805   IF (J.NE.5) GO TO 810
        WRITE (6,2810) (CTS(K),CTL(K),Y(K),DF(K),K=1,5)
 2810   FORMAT (1X,5(F7.1,F6.1,F6.1,F6.2))
  810   CONTINUE
      RETURN
      END
```

*** END OF MEMBER ***   798 RECORDS PROCESSED   ***

```
      SUBROUTINE ALFEFF(IF,ALT,SLTOZ,SLTAR,ALPHAF,BETAF,NCODE,IMES,ITBL)
C
C REED, BATLUCK, ZANNER, COOKE         JUN 1983  FORTRAN-IV IBM 360/370
C
C ALFEFF COMPUTES THE EFFECTIVE OZONE ABSORPTION AND SCATTERING COEFFI-
C   CIENTS FOR A FILTER, ADJUSTING FOR OZONE AND AIR OVERBURDENS AND AIR
C   TEMPERATURE. AEROSOL SCATTERING IS IGNORED. METHOD IS DERIVED FROM
C   THAT USED BY MCBRIDE AT NAVAL WEAPONS CENTER, CHINA LAKE, CA.
C
C ARGUMENTS:
C   IF     = FILTER NUMBER: 1-7 CORRESPONDING TO S3,S2,S1,S0,S3,S2,S1
C   ALT    = ALTITUDE - TO BE USED TO ACCESS AIR TEMP PROFILE IN SONDE.
C   SLTOZ  = OZONE SLANT OVERBURDEN (ATM-CM)
C   SLTAR  = AIR MASS - SLANT PATH (ATM)
C   ALPHAF = EFFECTIVE OZONE ABSORPTION COEFFICIENT
C   BETAF  = EFFECTIVE COEFFICIENT FOR RAYLEIGH SCATTERING
C   NCODE = -16  NO AIR TEMP FOR THIS ALT.
C     "   = -17  FILTER WAVELENGTH NOT IN 2401-3400A
C     "   = -18,-19  FILTER TRANS .LE. 0.
C
C OTHER SIGNIFICANT VARIABLES
C   GAMM(1000)    PRODUCT OF SOLAR FLUX, DIFFUSER TRANSMISSION, AND
C                 DETECTOR RESPONSIVITY.  240.1 TO 340.0 NM
C   BETA(1000)    RAYLEIGH SCATTERING COEFFICIENT
C   ABSZ(1000)    OZONE ABSORPTION COEFFICIENT, NEAR ROOM TEMPERATURE
C   ABST(800,2)   OZONE ABS. COEFF. AT TWO LOWER TEMP. 260.1-340.0 NM.
C   TEMPK(3)      TEMPERATURES FOR ABSZ AND ABST
C   FILTER(1000)  FILTER TRANSMISSION AS A FUNCTION OF WAVELENGTH
C
C
C
      DIMENSION TEMPK(3), STR(1000,3), FILTER(1000)
      COMMON/COEFTS/GAMM(1000),BETA(1000),ABSZ(1000),ABST(800,2)
      COMMON/PROFLS/DSB(3),MXSND,NECC(2),ECCLM(3,2),SONDE(5,70),
     X               ECC(4,19,2),STD(3,60)
      COMMON/FSHAPE/CH(7),BW(7),CMCBRD(4,7)
      EQUIVALENCE (GAMM(1),STR(1,1))
      DATA INIT/0/,LSTNF/0/
C
      RATMGA = 0.0
      RATMGB = 0.0
      NCODE = 0
      NF = IF
      IF (INIT .EQ. 1) GO TO 100
      ALPHAG = 0.0
      CALL INARRY(NCODE,TEMPK,IMES)
      CALL PRTPED(IMES)
      CALL TAPWRT(1,IMES)
      IF (NCODE .LT. 0) GO TO 999
      INIT = 1
C INITIALIZATION OF ARRAYS IS COMPLETE.
C
C INITIALIZE FOR THE FIRST ENTRY FOR EACH FILTER
  100 IF (NF.EQ.LSTNF) GO TO 140
      LSTNF = NF
C FILTER SHAPE : GAUSSIAN OR MEASURED?
```

```
      A0 = CMCBRD(1,IF)
      IF (A0 .NE. 0.) GO TO 130
      IF (IF.GT.4) GO TO 950
C READ MEASURED SHAPE - WRITE WHEN DETAILS OF WFF ARRAY ARE AVAILABLE.
      CALL SHAPE(NF,FILTER,LMA,LMB,IMES,NCODE)
      IF (NCODE.NE.0) GO TO 999
      GO TO 150
C OR ASSUME GAUSSIAN SHAPE BASED ON CENTER WAVELENGTH AND BANDWIDTH.
  130 IF (IF.GT.4) GO TO 140
      IF (CH(NF) .GT. 1000.) GO TO 131
C CONVERT NM TO A
      CH(NF) = CH(NF) * 10.
      BW(NF) = BW(NF) * 10.
  131 SIGMA = BW(NF)/2.355
      FSIGMA = 5. * SIGMA
C COMPUTE ARRAY INDEXES CORRESPONDING TO WAVELENGTHS IN FILTER
      LC = (CH(NF)-2401.)
      IF (LC.LT.1 .OR. LC.GT.1000) GO TO 930
      LMA = LC - FSIGMA
      LMB = LC + FSIGMA
      IF (LMA.LT.1) LMA = 1
```

```
      IF (LMB.GT.1000) LMB = 1000
C CALCULATE SHAPE
C
      DO 135 I = LMA,LMB
      WL = LC - I
      FILTER(I) = EXP(-(WL*WL)/(2*SIGMA*SIGMA))
  135 CONTINUE
C     WRITE (IMES,2135) LMA,LC,LMB,(I,FILTER(I),I=LMA,LMB)
 2135 FORMAT (1X,'ALFEFF 2135: LMA,LC,LMB = ',3I4,/1X,13(I4,F6.3))
C
C WEIGHT FILTER SHAPE WITH GAMM
  150 DO 155 I = LMA,LMB
  155 FILTER(I) = FILTER(I) * GAMM(I)
C
C USE MCBRIDE COEFFICIENTS
  140 IF (A0.EQ.0.) GO TO 200
      ALPHFM = CMCBRD(1,IF) + (CMCBRD(2,IF) * SLTOZ) +
     X (CMCBRD(3,IF) * SLTOZ*SLTOZ)
      BETAFM = CMCBRD(4,IF)
C     WRITE (IMES,2140) ALPHFM,BETAFM,IF
 2140 FORMAT('0ALFEFF 2140: MCBRIDES EFFECTIVE ALPHA AND BETA = :',
     X 2F10.6,' IF = ',I2)
      GO TO 850
C
C COMPUTE AVERAGE TEMPERATURE WEIGHTED FOR DENSITY
C   FROM SONDE PROFILE:
  200 ALTLM = ALT + 10.
      SUMA = 0.
      SUMB = 0.
C LOOK IN SONDE
      DO 220 I = 1, MXSND
      T = SONDE(1,I)
      IF (T .GT. ALTLM) GO TO 220
      SUMA = SUMA + (SONDE(4,I) * SONDE(2,I))
      SUMB = SUMB + SONDE(4,I)
      IF (T.LE.ALT) GO TO 250
  220 CONTINUE
C LOOK IN ECC PROFILE FOR TEMPERATURE DOWN TO ALT
      DO 240 J =1,2
         L = NECC(J)
         DO 235 I = 1,L
            T = ECC(1,I,J)
            IF (T .GT. ALTLM) GO TO 235
            IF (T .LT. ALT)   GO TO 235
C DENSITY IS PROPORTIONAL TO PRESS/TEMP
            SUMA = SUMA + ECC(3,I,J)
            SUMB = SUMB + ECC(3,I,J)/ECC(2,I,J)
  235       CONTINUE
  240    CONTINUE
  250 IF (SUMB .LE. 0.) GO TO 925
      TWT = SUMA/SUMB
C *** TEST STATEMENT
C     WRITE(IMES,2250) SUMA,SUMB,TWT
 2250 FORMAT(1X,'ALFEFF 2250: SUMA = ',G12.6,2X,'SUMB = ',G12.6,2X,
     X 'TWT = ',G12.6)
C
C CALCULATE EFFECTIVE ABSORPTION COEFF FOR THE WEIGHTED TEMPERATURE.
```

```
      SUMA = 0.                                                         00001430
      SUMB = 0.                                                         00001440
      SUMC = 0.                                                         00001450
      IF (TWT .LT. TEMPK(2)) GO TO 263                                  00001460
      ITA = 1                                                           00001470
      ITB = 2                                                           00001480
      GO TO 265                                                         00001490
  263 ITA = 2                                                           00001500
      ITB = 3                                                           00001510
  265 FRAC1 = (TWT-TEMPK(2))/(TEMPK(1)-TEMPK(2))                        00001512
      FRAC2 = (TWT - TEMPK(3))/(TEMPK(2) - TEMPK(3))                    00001520
C USE LIMITING FORMULA FOR ZERO OPTICAL DEPTHS.                         00001610
      DO 280 I = LMA, LMB                                               00001620
      T = FILTER(I)                                                     00001640
      IF (T .LE. 0.) GO TO 278                                          00001650
      SUMB = SUMB + T                                                   00001660
      SUMC = SUMC + T * BETA(I)                                         00001662
      K = I - 200                                                       00001668
      IF (I.GT.200 .AND. ABST(K,1).GT.0.) GO TO 270                     00001670
C INDEPENDENT OF TEMPERATURE                                            00001680
      SUMA = SUMA + T * ABSZ(I)                                         00001690
```

```
      GO TO 278
C DEPENDENT ON TEMP.
  270 IF (ITA.EQ.2 .AND. ABST(K,2).NE.0.) GO TO 275
      SUMA = SUMA + T * (ABST(K,1) + FRAC1 * (ABSZ(I)-ABST(K,1)))
      GO TO 278
  275 SUMA = SUMA + T * (ABST(K,2) + FRAC2 * (ABST(K,1)-ABST(K,2)))
  278 CONTINUE
C *** TEST STATEMENT
C     IF (I.EQ.LC) WRITE(IMES,2278) SUMA,SUMB,FRAC1,FRAC2,I,
C    X K,ABSZ(I),ABST(K,1),ABST(K,2)
 2278 FORMAT(1X,'ALFEFF 2278: SUMA =',G12.6,2X,'SUMB =',G12.6,2X,
     X 'FRAC1 =',G12.6,2X,'FRAC2 =',G12.6,2X,'I,K = ',2I5,/,
     X 14X,'ABSZ(I) =',G12.6,2X,'ABST(K,1) =',G12.6,2X,'ABST(K,2) =',
     X G12.6)
  280 CONTINUE
      IF (SUMB .LE. 0.) GO TO 935
      ALPHAG = SUMA/SUMB
      BETAG = SUMC/SUMB
      FLUXIN = SUMB
      ATAU = 0.0
C
C     WRITE (IMES,2280) NF,A0,ALPHAG,CMCBRD(4,IF),BETAG,FLUXIN
 2280 FORMAT ('0ALFEFF 2280: FILTER',I3,': MCBRIDE A0=',F9.4,' GAUSSIAN'
     X,' =',F9.4,' MCBBETA =',F9.5,' GAUSS BETA =',
     X F9.5,/11X,'FLUXIN =',F9.5)
  300 IF (SLTOZ .LT. 1.E-5 .AND. SLTAR .LT. 1.E-2) GO TO 850
C
C CALCULATE SUMS FOR ALPHAF FOR GIVEN SLANT BURDENS
C
  302 SUMA = 0.
      SUMB = 0.
      DO 320 I = LMA,LMB
      T = FILTER(I)
      IF (T .LE. 0.) GO TO 320
      B = BETA(I) * SLTAR
      Z = ABSZ(I) * SLTOZ
      IF (ABS(Z+B) .GT. 174.) GO TO 320
      K = I - 200
      IF (I.LT.201 .OR. ABST(K,1).LE.0.) GO TO 310
C DEPDT ON TEMPERATURE, I.E. LONGER THAN ABOUT 260.0 NM.
      IF (ITA.EQ.2 .AND. ABST(K,2).GT.0.) GO TO 305
      Z = SLTOZ * (ABST(K,1) + FRAC1 * (ABSZ(I)-ABST(K,1)))
      GO TO 310
  305 Z = SLTOZ * (ABST(K,2) + FRAC2 * (ABST(K,1)-ABST(K,2)))
  310 SUMA = SUMA + T * EXP(-Z-B)
      SUMB = SUMB + T * EXP(-B)
  320 CONTINUE
C
C ALPHA EFFECTIVE AND BETAF
C
      IF (SUMA .LE. 0.) GO TO 940
      ATAU = ALOG(SUMB/SUMA)
      ALPHFG = ATAU/SLTOZ
      TAU = ALOG(FLUXIN/SUMA)
      BTAU = TAU - ATAU
      BETAFG= BTAU/SLTAR
C *** TEST STATEMENT
```

```
C      WRITE (IMES,2320) SUMA,SUMB,ATAU,TAU,BTAU,BETAFG
 2320 FORMAT(1X,'ALFEFF 2320: SUMA =',G11.5,2X,'SUMB =',G11.5,2X,
     X 'ATAU =',G11.5,2X,'TAU =',2X,G11.5,2X,'BTAU =',G11.5,2X,
     X 'BETAF =',G11.5)
C
C CHOOSE COEFF. BASED ON MCBRIDE, GAUSSIAN, OR MEASURED SHAPE.
C
C SELECT ALPHAF AND BETAF
  850 AOMG = 0.0
      AFMG = 0.0
      BMG = 0.0
      IF (A0 .EQ. 0.) GO TO 860
C USE MCBRIDE VALUES
      ALPHAF = ALPHFM
      BETAF  = BETAFM
      IF (ALPHAG .LE. 0.) GO TO 990
      AOMG = A0/ALPHAG
      BMG = BETAFM/BETAG
      IF (ATAU.NE.0.) AFMG = ALPHFM/ALPHAG
      GO TO 990
C USE VALUES FROM MEASURED FILTER SHAPE
```

```
  860 IF (ATAU.NE.0.0) GO TO 865                                        00002196
      ALPHAF = ALPHAG                                                   00002198
      BETAF  = 1.9                                                      00002200
      GO TO 990                                                         00002202
  865 ALPHAF = ALPHFG                                                   00002204
      BETAF  = BETAFG                                                   00002206
      GO TO 990                                                         00002208
C                                                                       00002260
C ODDS AND ENDS                                                         00002270
C                                                                       00002280
C IN WEIGHTED AVE OF TEMPERATURE, NO DATA FOUND                         00002290
  925 WRITE (IMES,2925) ALT                                             00002300
 2925 FORMAT ('0ALFEFF 2925: NO TEMPERATURE AVAILABLE FOR ALT=',F9.2)   00002310
      NCODE = -16                                                       00002320
      GO TO 999                                                         00002330
C FILTER RANGE OUTSIDE OF AVAILABLE ARRAYS                              00002340
  930 WRITE (IMES,2930) CW(NF)                                          00002350
 2930 FORMAT ('0ALFEFF 2930: CENTER WAVELENGTH',F7.1,' IS NOT BETWEEN ' 00002360
     X'240.1 AND 340.0 NM')                                             00002370
      NCODE = -17                                                       00002380
      GO TO 999                                                         00002390
C                                                                       00002400
C SUMB LE 0, TEMP DEPT CALC.                                            00002410
  935 WRITE (IMES,2935) SUMB                                            00002420
 2935 FORMAT ('0ALFEFF 2935: IN TEMPR. DEPT. CALC. OF ALPHA-EFF,'       00002430
     X' SUMB =',E10.2)                                                  00002440
      NCODE = -18                                                       00002450
      GO TO 999                                                         00002460
C                                                                       00002470
C SUMA LE ZERO                                                          00002480
  940 WRITE (IMES,2940) SUMA                                            00002490
 2940 FORMAT ('0ALFEFF 2940: IN COMP OF ALPHAF , SUMA =',E10.2)         00002500
      NCODE = -19                                                       00002510
      GO TO 999                                                         00002520
C RATIOS REQUESTED; BUT MCBRIDE A0 = 0                                  00002522
  950 WRITE (IMES,2950) IF,A0                                           00002524
 2950 FORMAT(1X,'ALFEFF 2950: RATIOS REQUESTED (IF=',I2,') BUT A0=',    00002526
     X E9.2)                                                            00002528
      NCODE = -20                                                       00002530
      GO TO 999                                                         00002532
C                                                                       00002538
C NORMAL END                                                            00002540
  990 NCODE = 0                                                         00002550
  999 CONTINUE                                                          00002552
C *** TEST STATEMENT                                                    00002553
C     WRITE(IMES,2999) TWT,IF,ALT,SLTOZ,SLTAR,ALPHAF,BETAF,A0MG,AFMG,BMG00002554
 2999 FORMAT(1X,'ALFEFF 2999: TWT=',F6.2,' F#=',I2,' ALT=',F3.0,        00002556
     X ' SLTOZ=',F8.5,' SLTAR=',F8.5,' ALPHAF=',F9.5,' BETAF=',F6.4,    00002558
     X ' A0MG=',F6.4,' AFMG=',F6.4,' BMG=',F5.3)                        00002559
      RETURN                                                            00002560
      END                                                               00002570

*** END OF MEMBER ***    284 RECORDS PROCESSED    ************************************
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C                                                                       00000430
C SETUP INFORMATION: FLIGHT NUMBER, TAPE IN & OUT, FILTER CAL DATE,     00000440
C MANUFACTURER, DAY AND YEAR OF ASSEMBLY(?), FUTURE I.D.                00000442
      NCRD=1                                                            00000450
      READ(5,1005,END=980,ERR=990)FLT(1),TAPEIN,NFIN,TAPOUT,NFOT,MDY,   00000460
     X MFG,ICAL,ICLID                                                   00000462
 1005 FORMAT (1X,F6.1,2X,A8,I3.4X,A8,I3,4X,3(I2.1X),A4,1X,I5,1X,I6)     00000470
      WRITE(IECHO,1005) FLT(1),TAPEIN,NFIN,TAPOUT,NFOT,MDY,MFG,ICAL,    00000480
     X ICLID                                                            00000482
C START PEDIGREE RECORDS                                                00000490
      PED(1,5)= -500.                                                   00000500
      PED(2,5)= FLT(1)                                                  00000510
      CALL RPDAT0 (1,IYMD)                                              00000520
      PED(3,5)= IYMD(1) + 100.*IYMD(3) + 10000.*IYMD(2)                 00000530
      PED(5,5) = MFG                                                    00000532
      PED(6,5) = ICAL                                                   00000534
      PED(7,5) = ICLID                                                  00000536
      PED(8,5)= MDY(3) + 100.*MDY(2) + 10000.*MDY(1)                    00000540
C FILTER CALIBRATION DATA: OPTION;  S3,SHORTEST WAVELENGTH FIRST; NM     00000550
      WRITE (IECHO,2030)                                                00000560
 2030 FORMAT ('0OPT  TOP BASE  CTR NM BW NM    A0',10X,'A1',11X,'A2',6X,00000570
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```
      SUBROUTINE CARDS (NCODE,IMES,IECHO)
C
C   REED/BATLUCK/COOKE   FEB 1983
C
C
C   CARDS READS FROM DATA5 TO OBTAIN INPUT AND OUTPUT DATA LOCATIONS,
C   FILTER CALIBRATIONS, AND DATA FROM DOBSONS, DATASONDE AND ECC.
C   PROVISION IS MADE FOR TWO ECC SONDES.
C
C   INCLD(I) = 3,2,1,0,30,20,10        PROCESS THIS FILTER
C            = ANY NEGATIVE NUMBER     OMIT
C   TOP(I)   = HIGHEST ALTITUDE TO BE PROCESSED FOR THIS FILTER - KM
C   BASE(I)  = LOWEST ALTITUDE TO BE PROCESSED FOR THIS FILTER - KM
C
C   NCODE = 1  NO PROBLEMS
C         =-1  UNEXPECTED EOF
C         =-2  READ ERROR
C         =-3  DATASONDE IS NOT DESCENDING, AS EXPECTED.
C         =-4  ECC IS NOT ASCENDING, AS EXPECTED.
C
C   SONDE(1, ) = ALTITUDE (KM), STARTING AT TOP, FOR DATASONDE, EVERY KM
C        (2, ) = TEMPERATURE(KELVIN).
C        (3, ) = AIR PRESSURE,(MBAR),COMPUTED HYPSOMETRICALLY.
C        (4, ) = AIR DENSITY,(KG/M3),COMPUTED FROM P AND T.
C        (5, ) = ERROR (ONE SIGMA) IN AIR TEMPERATURE - KELVIN
C
C   DSB(1) = BASE ALTITUDE(KM) FOR USE WITH DATASONDE
C   DSB(2) = AIR TEMPERATURE(K) AT BASE ALT
C   DSB(3) = AIR PRESSURE(MBAR) AT BASE ALT
C
C   ECC(1, ) = ALTITUDE (KM) FOR ECC SONDE, AT STD PRESSURE LEVELS
C      (2, ) = TEMPERATURE (KELVIN)
C      (3, ) = AIR PRESSURE (MBAR), STARTING AT ABOUT 1000 MBAR
C      (4, ) = OZONE PARTIAL PRESSURE (NANOBAR)
C
C   ECCLM(1) = OZONE COLUMN (ATM-CM) AT 250 MBAR AIR PRESSURE
C   ECCLM(2) =   "      "        "   "  125   "   "     "
C   ECCLM(3) =   "      "        "   "  62.5  "   "     "
C
C   STD(1, ) = ALTITUDE (KM) MODEL, TO BE FILLED BY SUBROUTINE MODEL
C      (2, ) = OZONE NUMBER DENSITY (MOLECULES/M3)
C      (3, ) = OZONE OVERBURDEN (ATM-CM)
C
C   CMCBRD(1, ) = A0, AS GIVEN BY NWC, CHINA LAKE MEAS. AND COMPUTATIONS.
C         (2, ) = A1
C         (3, ) = A2
C         (4, ) = BETA
C
      REAL*8 TAPEIN,TAPOUT, FLTID
      DIMENSION IYMD(3), MDY(3), FLT(2)
      COMMON/SETUP/ TAPEIN,TAPOUT, NFIN, NFOT, INCLD(7),TOP(7),BASE(7)
      COMMON/PROFLS/ DSB(3),MXSND, NECC(2),ECCLM(3,2),
     X                        SONDE(5,70),ECC(4,19,2),STD(3,60)
      COMMON/FSHAPE/ CW(7),BW(7),CMCBRD(4,7)
      COMMON/DATOUT/ NSAV, PED(20,30), SAVE(20,60)
      EQUIVALENCE (FLTID,FLT(1))
```

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```
     X'BETA')
      DO 30 I=1,7
      NCRD=NCRD+1
      READ (5,1040,END=980,ERR=990)INCLD(I),TOP(I),BASE(I),CH(I),BW(I),
     X  (CMCBRD(J,I),J=1,4)
 1040 FORMAT (2X,I2,2F5.1,2X,F6.2,1X,F5.2,2X,F8.4,F12.5,F13.5,1X,F7.5)
C BE SURE CH & BW ARE IN NM
      IF (CH(I) .LT. 1000.) GO TO 28
      CH(I) = CH(I) / 10.
      BW(I) = BW(I) / 10.
   28 WRITE (6,1040) INCLD(I),TOP(I),BASE(I),CH(I),BW(I),
     X  (CMCBRD(J,I),J=1,4)
C     WRITE(IMES,2150) NCRD
   30 CONTINUE
      DO 40 I=1,2
      IS =(I-1)*6
      PED((9+IS),5) = CH(I)
      PED((10+IS),5) = BW(I)
      DO 40 J=1,4
      PED((10+J+IS),5) = CMCBRD(J,I)
   40 CONTINUE
      DO 45 I=3,4
      IS=(I-3)*6
      PED((9+IS),6)= CH(I)
      PED((10+IS),6)= BW(I)
      DO 45 J=1,4
      PED((10+J+IS),6) = CMCBRD(J,I)
   45 CONTINUE
      PED(1,6)= -501.
      NCRD = NCRD+1
C
C READ DOBSON DATA: DATE, AM, PM,IN DOBSON UNITS
      READ(5,1050,END=980,ERR=990) MDY,PED(3,6),PED(4,6)
 1050 FORMAT (2X,I2,1X,I2,1X,I2,2X,F5.1,2X,F5.1)
      WRITE (IECHO,2050)
 2050 FORMAT ('0      DATE      AM     PM  DOBSON UNITS')
      WRITE (IECHO,1050)  MDY, PED(3,6), PED(4,6)
C     WRITE(IMES,2150) NCRD
      PED(2,6) =  MDY(3) + 100.*MDY(2) + 10000.*MDY(1)
C
C READ DATASONDE FOR TEMP VS ALT.; BASE PRES & ALT FROM ECC SONDE OR STD
C FLIGHT ID, DATE, TIME, BASE ALT & PRES.; MAX ALTITUDE FIRST.
      NCRD=NCRD+1
      READ (5,1060,END=980,ERR=990) FLTID, MDY, IH, IM, MDEL, DSB
 1060 FORMAT (2X,A8,2X,I2,1X,I2,1X,I2,2X,I2,I2,2X,I3,2X,F7.1,2X,F6.2,2X,
     X F6.2)
      IF (DSB(1).GT.1000.) DSB(1) = DSB(1)/1000.
      IF (DSB(2).LT.100.)  DSB(2) = DSB(2) + 273.15
      WRITE (IECHO,2060)
 2060 FORMAT ('0 FLT ID    MM/DD/YY  HHMM  DMN     BALT   BTMP   BMBAR',
     X'   DATASONDE')
      WRITE (IECHO,1060) FLTID, MDY, IH, IM, MDEL, DSB
C     WRITE(IMES,2150) NCRD
      IF (DSB(1) .GT. 100.) DSB(1) = DSB(1)/1000.
      DO 70 I=1,70
      NCRD=NCRD+1
      READ (5,1070,END=980,ERR=990) ALT, TEMP, TERR
```

```
      IF (ALT .LE. 0.) GO TO 75
      MXSND = I
      IF (ALT .GT. 1000.) ALT = ALT/1000.
      SONDE(1,I) = ALT
      IF (TEMP .LT. 100.) TEMP = TEMP + 273.15
      SONDE(2,I) = TEMP
C OBTAIN ONE SIGMA ERROR; ADD ERROR DUE ATMOSPHERIC VARIABILITY
C (MINUTES BETWEEN DATASONDE AND ROCOZ).
      IF (MDEL.GT.100) MDEL = 100
      B = 0.32
      IF (SONDE(1,I) .LT. 52.5) B = 0.19
      SONDE(5,I) = SQRT(0.5*TERR*TERR + B*MDEL)
   70 CONTINUE
   75 IF (SONDE(1,1) .LT. SONDE(1,MXSND)) GO TO 970
 1070 FORMAT (2X,F6.0,2X,F6.2,2X,F4.1)
C PRESSURES AND DENSITIES ARE COMPUTED IN DATSND, AFTER LAUNCH LAT IS
C READ IN FROM THE PEDIGREE RECORDS.
      PED(1,7) = -502.
      PED(2,7) = SONDE(1,1)
      PED(3,7) = SONDE(1,MXSND)
      PED(4,7) = MXSND
```

```
      PED(5,7) = FLT(1)
      PED(6,7) = FLT(2)
      PED(7,7) = MDY(3) + 100.*MDY(2) + 10000.*MDY(1)
      PED(8,7) = 100.* IH + IM
      PED(9,7) = DSB(1)
      PED(10,7) = DSB(3)
C PED(11,7) AND (12,7) ARE FILLED AFTER VALUES ARE COMPUTED IN DATSND.
C
      DO 76 I = 1,8
      J = I + 12
   76 PED(J,7) = SONDE(2,I)
C
      DO 79 K = 8,10
      PED(1,K) = -503.
        DO 78 J = 2,20
        I = 7 + J + 19 * (K-8)
   78   PED(J,K) = SONDE(2,I)
   79 CONTINUE
      PED(4,5) = 0.0
C
C READ ECC DATA
      DO 200 J = 1,2
      K = 15 + 5 * (J-1)
      NCRD = NCRD+1
      READ (5,1080,END=980,ERR=990) FLTID,MDY,IH,IM,TIEALT,TIECOL
 1080 FORMAT(2X,A8,2X,I2,1X,I2,1X,I2,2X,I2,I2,2X,F6.0,2X,F7.5)
C THE NEXT THREE PED RECORDS (11,12,13) ARE RESERVED FOR MID-LAT OZONE
C MODEL
      IF (MDY(1).LE.0) GO TO 200
      PED(1,K) = -506.
      PED(2,K) = TIEALT
      PED(3,K) = TIECOL
      PED(5,K) = FLT(1)
      PED(6,K) = FLT(2)
      PED(7,K) = MDY(3) + 100.*MDY(2) + 10000.*MDY(1)
      PED(8,K) = 100.*IH + IM
      WRITE (IECHO,2080)
 2080 FORMAT ('0 FLT ID    MM/DD/YY  HHMM     ALT  ATM-CM     ECC SONDE')
      WRITE (IECHO,1080) FLTID,MDY,IH,IM,PED(2,K),PED(3,K)
C     WRITE(IMES,2150) NCRD
      PED(2,K) = PED(2,K)/1000.
      NECC(J) = 0
      DO 120 I =1,19
      READ (5,1120,END=125,ERR=990) KH,ECC(4,I,J),ECC(3,I,J),ECC(2,I,J)
 1120 FORMAT (2X,I5,2X,F5.1,2X,F6.1,2X,F5.1)
      IF (ECC(4,I,J).LE.0.) GO TO 120
      NECC(J) = NECC(J) + 1
      IF (ECC(2,I,J).LT.100.) ECC(2,I,J) = ECC(2,I,J) + 273.15
      ECC(1,I,J) = KH/1000.
  120 CONTINUE
  125 IF (ECC(1,NECC(J),J) .LT. ECC(1,1,J)) GO TO 960
       PED(4,5) = PED(4,5) + 1
      PED(4,K) = NECC(J)
C PUT ECC DATA IN PED RECORDS 15 - 18 AND 19 - 22
      CALL CMOVE(ECC(1,1,J),PED(9,K),48)
      DO 160 L = 1,4
      K = K + 1
```

```
      PED(1,K) = -507.                                                  00001434
      PED(2,K) = J                                                      00001435
      PED(3,K) = FLT(1)                                                 00001436
      PED(4,K) = FLT(2)                                                 00001438
      LT = 4 * L                                                        00001440
  160 CALL CMOVE(ECC(1,LT,J),PED(5,K),64)                               00001444
      IF (J.EQ.2) GO TO 200                                             00001445
  205 READ (5,1205) (ECCLM(I,J),I=1,3)                                  00001447
 1205 FORMAT (3(6X,F7.5))                                               00001449
  200 CONTINUE                                                          00001450
      NSAV = 24                                                         00001452
      NCRD = NCRD + NECC(1) + NECC(2) + 1                               00001460
      WRITE (IMES,2150) NCRD                                            00001470
 2150 FORMAT ('0CARDS 2150: NUMBER OF DATA5 RECORDS READ IS',I5)        00001480
      NCODE = 1                                                         00001490
      GO TO 999                                                         00001500
C ODDS AND ENDS                                                         00001510
C ECC ALT IS NOT ASCENDING AS EXPECTED                                  00001520
  960 WRITE (IMES,2960)                                                 00001530
 2960 FORMAT ('0CARDS 2960: ECC ALTITUDES SHOULD BE INCREASING')        00001540
      NCODE = -4                                                        00001550
```

```
      GO TO 999
C DATASONDE ALTITUDE IS NOT DESCENDING, AS EXPECTED.
  970 WRITE (IMES,2970)
 2970 FORMAT ('0CARDS 2970: DATASONDE ALTITUDES SHOULD BE DECREASING')
      NCODE = -3
      GO TO 999
C UNEXPECTED EOF
  980 WRITE (IMES,2980) NCRD
 2980 FORMAT (' CARDS 2980: UNEXPECTED EOF ON DATA5. RECORD NO',I4)
      NCODE = -1
      GO TO 999
C READ ERROR
  990 WRITE (IMES,2990) NCRD
 2990 FORMAT (' CARDS 2990: READ ERROR ON DATA5 RECORD NO',I4)
      NCODE = -2
  999 RETURN
      END
```

*** END OF MEMBER *** 252 RECORDS PROCESSED **

```
      SUBROUTINE CFTWRT(TEMPK,IRNG,IMES)
C
C COOKE                        JULY 1983
C
C CFTWRT PRINTS OUT THE VALUES FOR TEMPK AND IRNG AS WELL AS THE
C  VALUES OF THE CONTENTS OF COMMON/COEFTS (ARRAYS GAMM,BETA,ABSZ,
C  AND ABST).
C
      DIMENSION IRNG(2,7),TEMPK(3)
      COMMON/COEFTS/GAMM(1000),BETA(1000),ABSZ(1000),ABST(800,2)
C
C
C PRINT OUT TEMPK AND IRNG
      WRITE(IMES,2020) TEMPK
      WRITE(IMES,2030) ((IRNG(I,J),J=1,7),I=1,2)
C
C PRINT OUT GAMM ARRAY
      WRITE(IMES,2040)
      WRITE(IMES,2000) (L,L=1,10)
      J = 0
      K = 0
      DO 100 M = 1,100
        WRITE(IMES,2080) J,(GAMM(I+K),I=1,10)
        K = K + 10
        J = J + 1
  100   CONTINUE
C
C PRINT OUT BETA ARRAY
      WRITE(IMES,2050)
      WRITE(IMES,2000) (L,L=1,10)
      J = 0
      K = 0
      DO 200 M = 1,100
        WRITE(IMES,2080) J,(BETA(I+K),I=1,10)
        K = K + 10
        J = J + 1
  200   CONTINUE
C
C PRINT OUT ABSZ ARRAY
      WRITE(IMES,2060)
      WRITE(IMES,2000) (L,L=1,10)
      J = 0
      K = 0
      DO 300 M = 1,100
        WRITE(IMES,2080) J,(ABSZ(I+K),I=1,10)
        K = K + 10
        J = J + 1
  300   CONTINUE
C
C PRINT OUT ABST ARRAY
      WRITE(IMES,2100)
      L = 1
      N = 2
      WRITE(IMES,2110) L,N,L,N,L,N,L,N
      DO 400 K = 1,100
        K1 = K + 100
```

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      K2 = K + 200
      K3 = K + 300
      WRITE(IMES,2150) K,(ABST(K,I),I=1,2),K1,(ABST(K1,I),I=1,2),
     X K2,(ABST(K2,I),I=1,2),K3,(ABST(K3,I),I=1,2)
  400 CONTINUE
      WRITE(IMES,2110) L,N,L,N,L,N,L,N
      DO 500 K = 1,100
      K4 = K + 400
      K5 = K + 500
      K6 = K + 600
      K7 = K + 700
      WRITE(IMES,2150) K4,(ABST(K4,I),I=1,2),K5,
     X (ABST(K5,I),I=1,2),K6,(ABST(K6,I),I=1,2),K7,
     X (ABST(K7,I),I=1,2)
  500 CONTINUE
C
 2000 FORMAT(/,2X,10(10X,I2),//)
 2020 FORMAT(1X,' TEMPK = ',3G12.3)
 2030 FORMAT(/,1X,' IRNG =',//,2(1X,7I7,/))
 2040 FORMAT(/,1X,' GAMM =')
 2050 FORMAT(//,1X,' BETA =')
```

26JUL84 08.53.47 - VOL=SACC10, DSN=L3EIR.PROF.CNTL   MEMBER=CFTWRT

```
 2060 FORMAT(//,1X,' ABSZ =')
 2080 FORMAT(1X,I2,5X,10(G10.3,2X))
 2100 FORMAT(//,1X,' ABST =')
 2110 FORMAT(//,13X,3(I1,11X,I1,18X),I1,11X,I1)
 2150 FORMAT(3X,4(I3,2X,G10.3,2X,G10.3,4X))
C
      RETURN
      END
```

*** END OF MEMBER ***   85 RECORDS PROCESSED   **

```
      SUBROUTINE CHECKS(NCODE,IMES,ICHK)
C
C REED, BATLUCK, COOKE
C
C CHECKS EVALUATES THE SET OF OBSERVATIONS AS FOLLOWS:
C 1. CONSISTENCY AMONG THE FILTERS AND FILTER-RATIOS.
C 2. COMPUTE OVERBURDEN AS A FUNCTION OF ALTITUDE.
C 3. COMPARE DENSITIES WITH MODEL USED IN THIS PROGRAM.
C 4. COMPARE ROCOZ + ECC COLUMN WITH DOBSON DATA.
C 5. ADD AIR T AND P TO COMPOSITE PROFILE
C 6. COMPARE VARIOUS ESTIMATES OF RATE OF CHANGE OF LN I.
C 7. LOOK AT VARIATION OF COMP CHANNELS VS THAT EXPECTED DUE TO SZA AND
C     SCATTERING.
C 8. LOOK AT CONSTANCY OF APPARENT DRAG CROSS SECTION.
C
C ARGUMENTS
C   NCODE = 0   NORMAL RETURN
C
C   IMES  = PRINTER UNIT FOR PROBLEM MESSAGES
C   ICHK  = PRINTER UNIT FOR COMPUTATIONAL RESULTS
C
C ARRANGEMENT OF DATA IN WORK: INITIALLY, WORDS 1-20 ARE FILLED IN
C   COMPST. BEFORE RETURNING, THE CONTENTS BECOME:
C 1 NO OF VALUES/ 300.              11 AIR PRESSURE ERROR  X
C 2 ALTITUDE - KM, 70. TO 0.        12 B       / O3 PART PRESS NANOBAR
C 3 OZONE DENSITY  -ATM-CM/KM       13 B ERROR / O3 PART PRESS ERROR X
C 4 OZONE DENSITY    NUMBER/M3      14 CMP STDV/ O3 VOL MIXING RATIO
C 5 OZONE DENSITY    ERROR X        15 D(LNI)DH/ O3   "     "     " ERR X
C 6 OZONE VERTICAL COLUMN- ATM-CM   16 TIME GMT HHMMSS.S
C 7 OZONE VERTICAL COLUMN- ERROR X  17 TIME SECONDS AFTER HOUR
C 8 AIR TEMPERATURE-KELVIN          18 D(LN I) DH-NOISE/ NO OF VALUES
C 9 AIR TEMPERATURE X               19 SZA
C10 AIR PRESSURE    MBAR           20 COMP WORD / RECORD NO.
C
C ARRANGEMENT OF DATA IN TABLE:
C(1)OVERLAPS  (3)COMPOSITE-MDL (6)SLOPES     (7)COMP.CH.
C 1 FILTER 1    1 ALTITUDE-KM    1 ALTITUDE KM 1AALTITUDE 1BALTITUDE
C 2 FILTER 2    2 CMP DENS/M3    2 D(LNI)/DH   2 OBS COMP 2 COS SZA
C 3 MAX ALT     3 CMP ERROR X    3    "   NOISE 3 COS SZA  3 1- SLAT
C 4 MIN ALT     4 MDL DENS/M3    4 B           4 SZA=0 CM 4 CORRECT
C 5 NUM PAIRS   5 CMP - MDL X    5 B STD DEV   5          5 PRED CM
C 6 A           6 CMP COL ATM-CM 6 DIFF        6          6 OBS CM
C 7 SIGMA A     7 CMP   "    X   7 ERR   RMS   7          7 X DIFF
C 8 B           8 MDL COL        8 DIFF X      8          8
C 9 SIGMA B     9 CMP-MDL ATM-CM 9 -           9          9
C10 R2         10  "       X    10 -          10         10
C
C(8)DRAG (TAB)
C 1 ALTITUDE
C 2 VELOCITY
C 3 ACCELER.
C 4 AIR DENS
C 5 APP DRAG C
C
C
      REAL*8  X2
```

```
      DIMENSION TAB(6,60),HEADS(7)                                      00000570
C                                                                       00000580
      COMMON/SETUP/DUM(4),INCLD(7),TOP(7),BASE(7)                       00000590
      COMMON/PROFLS/DSB(3),MXSND,NECC(2),ECCLM(3,2),SONDE(5,70),        00000600
     X              ECC(4,19,2),STD(3,60)                               00000610
      COMMON/DATAIN/NLAYRS,SECSZA(60),SAVE(20,60,7)                     00000620
C NOTE THAT ARRAYS IN DATOUT ARE REDEFINED.                             00000630
      COMMON/DATOUT/NSAV,NDXTOP,NDXBAS,NLVLS,DM(10),DOBTM,DOBAM,DOBPM,  00000640
     X PMDL(2),ECTIE,ECCOL,WORK(20,71),TABLE(10,36)                     00000650
      COMMON/CONSTT/AVOGAD,VOLSTP,RSTAR,DGTORD,GRV45,AIRM,GRV,RZRO      00000660
C                                                                       00000670
      EQUIVALENCE (TAB(1,1),TABLE(1,1))                                 00000680
      DATA HEADS/' S3 ',' S2 ',' S1 ',' S0 ','S3/0','S2/0','S1/0'/      00000682
C                                                                       00000690
C                                                                       00000700
      NCODE = 0                                                         00000710
C(1) CHECK CONSISTENCY IN THE OVERLAP REGIONS.                          00000720
      CALL OVERLP(IMES,ICHK)                                            00000730
C                                                                       00000740
C (2) COMPUTE OZONE COLUMN AND ERROR AT EACH LEVEL                      00000750
C  OBTAIN INITIAL OVERBURDEN FROM MODEL AND ADJUST TO COMPOSITE PROFILE.00000760
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```
      ISTD = (71.1-WORK(2,NDXTOP))
      WORK(6,NDXTOP) = STD(3,ISTD) * WORK(4,NDXTOP) / STD(2,ISTD)
C *** TEST STATEMENT
C     WRITE(IMES,2010) ISTD,WORK(6,NDXTOP),STD(3,ISTD),WORK(4,NDXTOP),
C    X                 STD(2,ISTD)
 2010 FORMAT(1X,'CHECKS 2010: ISTD =',I4,' WORK(6,NDXTOP) =',G10.3,
     X' STD(3,ISTD) =',G10.3,' WORK(4,NDXTOP) =',G10.3,' STD(2,ISTD) =',
     X G10.3)
C ASSUME INITIAL COLUMN ERROR IS DUE TO DENSITY ERROR PLUS 15% ERROR IN
C SCALE HEIGHT. AT LOWER LEVELS, ERROR IS DUE TO ERRORS IN DENSITIES.
      WORK(7,NDXTOP) = SQRT(WORK(5,NDXTOP)*WORK(5,NDXTOP)+225.)
      IA = NDXTOP + 1
      DO 50 I = IA,NDXBAS
        A = 0.5 * WORK(3,I-1)
        B = 0.5 * WORK(3,I)
        WORK(6,I) = WORK(6,I-1) + A + B
        ERRTOP = WORK(7,I-1) * WORK(6,I-1)
        A = A * WORK(5,I-1)
        B = B * WORK(5,I)
        WORK(7,I) = SQRT(ERRTOP*ERRTOP + A*A + B*B)/WORK(6,I)
   50 CONTINUE
C
C (3) COMPARE COMPOSITE PROFILE TO MODEL.
      WRITE (ICHK,2050) PMDL(1),PMDL(2)
 2050 FORMAT ('1COMPARISON OF COMPOSITE PROFILE WITH ',2A4,' MODEL'/
     X'0 ALT-KM  COMP O3 /M3 COMP ERR %  MODL O3 /M3 COMP-MODL %',
     X'  COMP COL ATM-CM COMP ERR %      MODEL COL COMP-MODL ATM-CM   ',
     X'    %'/)
C
      DO 100 I = NDXTOP,NDXBAS
        TABLE(1,1) = WORK(2,I)
        TABLE(2,1) = WORK(4,I)
        TABLE(3,1) = WORK(5,I)
        TABLE(4,1) = STD (2,I)
        TABLE(5,1) = (TABLE(2,1)-TABLE(4,1)) * 100./TABLE(2,1)
        TABLE(6,1) = WORK(6,I)
        TABLE(7,1) = WORK(7,I)
        TABLE(8,1) = STD (3,I)
        TABLE(9,1) = WORK(6,I) - STD(3,I)
        TABLE(10,1)= 100. * TABLE(9,1)/TABLE(6,1)
        WRITE (ICHK,2100)  (TABLE(J,1),J=1,10)
 2100   FORMAT (1X,F7.0,E13.4,F11.1,E13.4,F12.2,F17.7,F11.2,F15.7,F16.7,
     X  F10.2)
  100   CONTINUE
C
C (4) COMPARE TOTAL COLUMN VALUES
C
      IF (DOBAM .LE. 0) DOBAM = DOBPM
      IF (DOBPM .LE. 0) DOBPM = DOBAM
      NLV = (71. - ECTIE)
      RCOL = WORK(6,NLV)
      COL  = RCOL + ECCOL
C  ASSUME ERROR IN ECC COLUMN VALUE IS 10% , IN DOBSON, 7%,
C  CONVERT DOBSON MILLI ATM-CM TO ATM-CM
      DBAVE = 5.0E-4 * (DOBAM+DOBPM)
      ERDOB = 0.07 * DBAVE
      ERROC = WORK(6,NLV) * WORK(7,NLV) * 0.01
```

```
      ERECC = 0.1 * ECCOL
      ERCOL = SQRT(ERROC*ERROC + ERECC*ERECC)
      DIF   = COL - DBAVE
      DFERR = SQRT(ERCOL*ERCOL + ERDOB*ERDOB)
      DIFPC = 200. * DIF/(DBAVE+COL)
      WRITE(ICHK,2110) ECTIE, RCOL, ERROC, ECTIE, ECCOL, ERECC, COL,
     X  ERCOL, DBAVE, ERDOB, DIF, DFERR, DIFPC
 2110 FORMAT(//'0COMPARE ROCOZ + ECC COLUMN CONTENT WITH DOBSON TOTAL'//
     X 20X,'ATM-CM    ERROR'/' ROCOZ ',F3.0,'+ KM',3X,2F9.5/' ECC 0-',
     X F3.0,' KM',4X,2F9.5/' TOTAL',11X,2F9.5/' DOBSON',10X,2F9.5,/
     X ' ROCOZ+ECC-DOBSON',2F9.5,' OR',F7.2,' PERCENT'/)
C
C (5) ADD AIR T AND P TO COMPOSITE PROFILE.
C     COPY NEEDED DATA FROM SONDE AND ROCOZ PROFILES.
C
      ALT = WORK(2,NDXTOP)
      DO 118 I = 1,MXSND
        J = I-1
        IF (ALT .EQ. SONDE(1,I)) GO TO 120
  118 CONTINUE
  120 DO 130 I = NDXTOP,NDXBAS
```

```
         J = J+1
         WORK (8,I) = SONDE(2,J)
         WORK (9,I) = 100. * SONDE(5,J)/SONDE(2,J)
         WORK(10,I) = SONDE(3,J)
         WORK(11,I) = 100./DSB(3) + WORK(9,I)
  130 CONTINUE
C (6) COMPARE ESTIMATES OF RATE OF CHANGE OF LN I.
      WRITE(ICHK,2130)
 2130 FORMAT('1')
C ***********************************************************************
C *** BECAUSE OF THE MALFUNCTIONING OF THE 0 FILTER FOR FLT 329,
C *** THE FOLLOWING 'DO 160' LOOP IS PERFORMED ONLY THREE TIMES
C *** (FOR FILTERS 3,2,1) INSTEAD OF THE USUAL 7 TIMES.
C ***********************************************************************
C     DO 160 I= 1,3
      DO 160 I=1,7
C FIND LEVEL IN COMPOSITE (WORK) FOR SAVE(2,1,I)
        DO 135 L = NDXTOP,NDXBAS
         N = L
         IF (SAVE(2,1,I) .EQ. WORK(2,N)) GO TO 138
  135    CONTINUE
  138 NA = N
C MOVE DATA FOR I FILTER INTO WORK
         DO 145 J= 1,59,2
         WORK(12,N) = SAVE(18,J,I)
         WORK(13,N) = SAVE(19,J,I)
         WORK(14,N) = 0.0
         WORK(16,N) = SAVE(4,J+1,I)
         WORK(17,N) = SAVE(19,J+1,I)
         WORK(19,N) = SAVE(5,J+1,I)
         WORK(20,N) = SAVE(3,J,I)
         WORK(15,N) = SAVE(10,J,I)
         WORK(18,N) = SAVE(16,J,I)
         IF (SAVE(20,J+1,I) .LE. 0.) GO TO 150
         N = N+1
  145    CONTINUE
  150 NB = N
C *** TEST STATEMENT  -  DISPLAY FOR I FILTER
C 155 WRITE(IMES,2155) ((WORK(K,M),K=1,20),M=NA,NB)
 2155 FORMAT ('1CHECKS 2155: COMPOSITE ARRAY'/
     X ' NO ALT ATMCM /KM O3NUM/M3 ER% ATM-CM ER% ATMP ER% AMBAR',
     X ' ER% BSMOOTH STD DEV 0 DLNIH HHMMSS.S SECND NOSDIF  SZA COMP'/
     X(1X,F2.0,F4.0,1X,E8.3,1X,E8.3,F4.1,1X,F6.5,1X,F4.1,F5.0,F4.1,F6.2,
     X 1X,F4.1,F8.4,1X,F6.5,2X,I1,1X,F5.4,F9.1,F6.0,1X,F6.5,F5.1,F6.1))
      WRITE (IMES,2157) HEADS(I)
 2157 FORMAT(/' COMPARISON OF D(LN I)/DH WITH B FROM SMOOTH FOR ',
     X'FILTER ',A4/' ALT-KM D(LN I)/DH  NOISE  B(SMOOTH)  STDEV ',
     X'DIFFERENCE+,- ERROR DIFF%'/)
      M = 1
      DO 156 J= NA, NB
         TABLE(1,M) = WORK(2,J)
         TABLE(2,M) = WORK(15,J)
         TABLE(3,M) = WORK(18,J)
         TABLE(4,M) = WORK(12,J)
         TABLE(5,M) = WORK(13,J)
         TABLE(6,M) = TABLE(2,M)-TABLE(4,M)
         TABLE(7,M) = SQRT(TABLE(3,M)*TABLE(3,M)+TABLE(5,M)*TABLE(5,M))
```

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```
      TABLE(8,M) = 200. * TABLE(6,M) / (TABLE(2,M)+TABLE(4,M))       00001802
      M = M + 1                                                        00001804
      IF (M .GT. 36) GO TO 158                                         00001806
  156 CONTINUE                                                         00001808
  158 J = M - 1                                                        00001810
      WRITE (IMES,2160) ((TABLE(L,M),L=1,8),M=1,J)                     00001818
 2160 FORMAT (1X,F6.0,F11.4,F7.4,F11.4,F7.4,F11.4,F7.4,F8.2)           00001820
  160 CONTINUE                                                         00001832
C (7) VARIATION OF COMPENSATION CHANNEL.                                00001840
C   7-A  DETERMINE EXPECTED VALUE OF COMP CHANNEL FOR SZA=0.           00001850
C          TRY TO USE DATA BETWEEN 50 AND 35 KM.                       00001860
      IF (NDXTOP .GT. 36) GO TO 175                                    00001870
      N  = 0                                                           00001880
      NA = 0                                                           00001890
      X  = 0.0                                                         00001900
      X2 = 0.0                                                         00001910
      J = 21                                                           00001912
      IF (J.LT.NDXTOP) J = NDXTOP                                      00001914
      DO 170 I= J,36                                                   00001920
        N = N+1                                                        00001930
        TABLE(1,N) = WORK(2,I)                                         00001940
```

```
         TABLE(2,N) = WORK(20,I)
         IF (TABLE(2,N) .GE. 1015.) GO TO 170
         TABLE(3,N) = COS( WORK(19,I)*DGTORD)
         TABLE(4,N) = TABLE(2,N)/TABLE(3,N)
         X2 = X2 + TABLE(4,N)*TABLE(4,N)
         X  = X  + TABLE(4,N)
         NA = NA + 1
  170 CONTINUE
C  OBTAIN AVERAGE AND STD. DEV.
      AVEC = X/NA
      STDV = DSQRT((X2 - N*AVEC*AVEC)/((N-1)*N))
      WRITE (ICHK,2170) AVEC,STDV, ((TABLE(I,J),I=1,4),J=1,N)
 2170 FORMAT ('1CHECKS 2170: ',
     X' COMPENSATION CHANNEL FOR SZA=0, BASED ON DATA 50 - 35',
     X' KM, IS',F8.1,'+,-',F7.1,' COUNTS.'//' ALTITUDE   OBS.COMP',
     X'  COS SZA  COMP(SZA=0)'//(1X,F8.0,F10.2,F9.3,F13.2))
      GO TO 180
C SINCE DATA ABOVE 40 KM IS NOT AVAILABLE, CALC COMP(SZA=0) FROM TOP ALT
  175 SECANT = 1./COS(WORK(19,NDXTOP)*DGTORD)
      AVEC = WORK(20,NDXTOP)*SECANT/(1.-0.376*(SECANT**0.874)*(10. **
     X (WORK(2,NDXTOP)/16.)))
      WRITE (ICHK,2175) AVEC, WORK(2,NDXTOP)
 2175 FORMAT ('1CHECKS 2175: ',
     X' COMPENSATION CHANNEL FOR SZA=0 IS',F7.0,' COUNTS,',
     X ' BASED ON DATA AT',F5.0,' KM.')
C
C  7-B COMPARE OBS COMP VALUES WITH ESTIMATES BASED ON SZA AND SCATTER-
C      ING. THE R.FRASER FORMULA IS USED TO ESTIMATE SCATTERING.(THOMAS
C      ET.AL, APPL.OPT.,21,2436,JULY 1,1982)
C
  180 IA = 31
      N = 0
      DO 190 I= NDXTOP,NDXBAS
         N = N+1
         TABLE(1,N) = WORK(2,I)
         TABLE(2,N) = COS(WORK(19,I)*DGTORD)
         TABLE(3,N) = (1. - 0.376 * ( 1./TABLE(2,N))**0.874)/10.**
     X                (TABLE(1,N)/16.)
         TABLE(4,N) = TABLE(2,N) * (1.-TABLE(3,N))
         TABLE(5,N) = TABLE(4,N) * AVEC
         TABLE(6,N) = WORK(20,I)
  190    TABLE(7,N) = 100. * (TABLE(5,N)-TABLE(6,N)) / TABLE(5,N)
      WRITE (ICHK,2190) ((TABLE(I,J),I=1,7),J=1,N)
 2190 FORMAT ('0CHECKS 2190:'/
     X '0 ALTITUDE  COS SZA  1-SCATTRD  CORR FACTR  PRED COMP',
     X'  OBS COMP  PR-OB/PR %'//(1X,F8.0,F9.3,F11.5,F12.4,F11.0,F10.0,
     X  F12.2))
C
C (8) LOOK AT CONSTANCY OF DRAG COEFFICIENT
C                                  = 2*DRAG /(DENSITY * VEL**2 * AREA)
C REYNOLDS NUMBER = VELOCITY * SIZE * DENSITY / DYNAMIC VISCOSITY
C DYNAMIC VISCOSITY
C    = (1.458E-6 * TEMP**1.5) / (TEMP + 110.4)
C   U.S. STD ATMOSPHERES, 1976, P.19; STARUTE IS 7 FEET DIAMETER.
  200 IA = NDXTOP + 1
      IB = NDXBAS - 1
      N  = 0
```

```
      DIA = 7. * 0.3048                                               00002462
      AREA = 3.14159 * DIA * DIA * 0.25                               00002464
      CON = 100. * AIRM/RSTAR                                         00002468
      DO 205 I = IA,IB                                                00002470
        N = N+1                                                       00002480
        TAB (1,N) = WORK(2,I)                                         00002490
        TAB (3,N) = WORK(17,I+1) - WORK(17,I-1)                       00002500
        TAB (2,N) = 2000./TAB(3,N)                                    00002510
        DVIS = (1.458E-6 * WORK(8,I)**1.5) / (WORK(8,I)+110.4)        00002512
        TAB (4,N) = WORK(10,I) * CON/WORK(8,I)                        00002514
  205   TAB(6,N) = DIA * TAB(2,N) * TAB(4,N) / DVIS                   00002520
      IB = N-1                                                        00002540
      DO 210 I = 2,IB                                                 00002550
        TAB (3,I) = (TAB(2,I+1)-TAB(2,I-1))/TAB(3,I)                  00002560
  210   TAB (5,I) = 2. * (GRV + TAB(3,I))/(TAB(4,I)*TAB(2,I)*TAB(2,I) 00002570
     X       * AREA)                                                  00002572
      WRITE (ICHK,2210) ((TAB(I,J),I=1,6),J=2,IB)                     00002580
 2210 FORMAT ('1CHECKS 2210:'/                                        00002582
     X'0CHECK OF DRAG COEFFICIENT VS ALTITUDE'//                      00002590
     X' ALTITUDE  VELOCITY  ACCELER   AIR DENS     DRAG C  REYNOLDS', 00002600
     X' NO.'//(1X,F8.0,F10.2,F9.4,E11.3,F10.3,F12.0))                 00002610
```

```
C
C COMPLETE COMPOSITE TABLE IN WORK
      CONP = 0.1 * RSTAR/VOLSTP
      DO 300 I = NDXTOP, NDXBAS
      WORK(12,I) = CONP * WORK(8,I) * WORK(3,I)
      WORK(13,I) = SQRT(WORK(5,I)*WORK(5,I) + WORK(9,I)*WORK(9,I))
      WORK(14,I) = WORK(12,I)/WORK(10,I)
      WORK(15,I) = SQRT(WORK(11,I)*WORK(11,I)+WORK(13,I)*WORK(13,I))
        WORK(18,I) = WORK(1,I)
        WORK(1, I) = 300.
  300   WORK(20,I) = I
      WORK(20,NDXBAS) = -1.
      NCOPE = 0
  999 RETURN
      END
```

*** END OF MEMBER ***   326 RECORDS PROCESSED   **

```
      SUBROUTINE COMPST(NCODE,IMES)
C
C REED, BATLUCK, COOKE
C
C COMPST EXAMINES UP TO SEVEN DATASETS (S3,S2,S1,S0,S3/S0,S2/S0,S1/S0)
C   AND DERIVES A "COMPOSITE" PROFILE. EACH ALTITUDE LEVEL IS AN
C   AVERAGE OF AVAILABLE DATA, WEIGHTED BY THE INVERSE OF THE ASSOCIATED
C   ERROR. ERROR INCLUDES THAT DUE TO ERROR IN ALTITUDE.
C
C THE AREA IN COMMON/DATOUT/ IS REASSIGNED TO PROVIDE A WORKSPACE FOR
C   THE MANIPULATION OF THE VARIOUS AVAILABLE PROFILES. CONTENTS OF WORK
C   IN THIS SUBROUTINE BECOME:
C 1 NUMBER OF VALUES AT THIS LEVEL  11 S1    O3 DENSITY  ATM-CM/KM
C 2 ALTITUDE - KM  70. - 0          12 S1    "    "      ERROR %
C 3 OZONE DENSITY  ATM-CM/KM        13 S0    "    "      ATM-CM/KM
C 4   "      "     NUMBER/M3        14 S0    "    "      ERROR %
C 5   "      "     % ERROR          15 S3/S0 "    "      ATM-CM/KM
C 6 ALT. ERROR,%; RESULTING O3 ERR% 16 S3/S0 "    "      ERROR %
C 7 S3 O3 DENSITY -ATM-CM/KM        17 S2/S0 "    "      ATM-CM/KM
C 8 S3  "    "    -ERROR %          18 S2/S0 "    "      ERROR %
C 9 S2  "    "    -ATM-CM/KM        19 S1/S0 "    "      ATM-CM/KM
C10 S2  "    "    -ERROR %          20 S1/S0 "    "      ERROR %
C
C NOTE THAT THE TYPE 1XX AND 2XX PROFILE TAPE RECORDS ARE NOW LOCATED
C   IN SMOOTH.
C
      COMMON/DATAIN/NLAYRS,SECSZA(60),SMOOTH(20,60,7)
C
      COMMON/DATOUT/NJAV,NDXTOP,NDXBAS,NLVLS,DM(17),WORK(20,89)
C
      COMMON/CONSTT/AVOGAD,VOLSTP,DUM(6)
C
C DM IS FILLED AS FOLLOWS:
C  1 MMDDYY.  ROCOZ LAUNCH          10
C  2 HHMMSS.S   "      "            11 DATE OF DOBSON OBS
C  3 LATITUDE   "      "            12 AM DOBSON
C  4 LONGITUDE  "      "            13 PM DOBSON
C  5 ROCOZ FLIGHT NO                14 MODEL ID
C  6 DATE REF RADAR TAPE            15   "    "
C  7 LAUNCH SITE                    16 ECC TIE ON ALT
C  8   "     "                      17 ECC COL TO TIE ON
C  9   "     "
C 10   "     "
C
      CONR = 1.E-5 * AVOGAD/VOLSTP
      CALL CMOVE(NDXBAS,DM(5),4)
      DM(11) = WORK(2,5)
      DM(12) = WORK(3,5)
      DM(13) = WORK(5,5)
      DM(14) = WORK(5,10)
      DM(15) = WORK(6,10)
      DO 5 I = 11,15
        IF (WORK(1,I).NE.-506.) GO TO 5
        DM(16) = WORK(2,I)
        DM(17) = WORK(3,I)
        GO TO 6
```

```
    5   CONTINUE                                                        00000562
    6 WORK(1,1) = 0.                                                    00000580
      CALL CMOVE(WORK(1,1),WORK(2,1),7116)                              00000590
      NDXTOP = 0                                                        00000600
      NDXBAS = 0                                                        00000610
C ASSIGN ALTITUDES TO WORK, FROM 70 TO 0 KM, 1 KM INTERVALS.            00000620
      DO 20 I = 1,71                                                    00000630
C                                                                       00000640
   20 WORK(2,I) = 71. - I                                               00000650
C                                                                       00000660
C TRANSFER OZONE DENSITIES AND ERRORS FROM SMOOTH. (1XX AND 2XX RECORDS)00000670
C                                                                       00000672
C **** BECAUSE THE 0 FILTER IN FLT. 329 WAS MALFUNCTIONING, THE         00000674
C **** FOLLOWING 'DO 50' LOOP IS ONLY DONE THROUGH FILTER 1. THE        00000676
C **** RATIO DATA FROM SMOOTH IS NOT BEING USED IN DETERMINING          00000678
C **** NDXTOP AND NDXBAS. NORMALLY THIS LOOP IS DONE 7 TIMES, BUT       00000680
C **** IT IS ONLY DONE THREE TIMES FOR FLT. 329.                        00000682
C     DO 50 ISM = 1,3                                                   00000690
      DO 50 ISM = 1,7                                                   00000695
         IT = (SMOOTH(2,1,ISM) + 0.01)                                  00000700
         IF (IT .LE. 0) GO TO 50                                        00000710
```

```
         IT = (SMOOTH(1,1,ISM) - 99.9)
            IF (IT.GE.10) IT = (IT/10) - 4
         IW1 = 13 - 2*IT
C *** TEST
C     WRITE(6,2050) ISM,SMOOTH(2,1,ISM),SMOOTH(1,1,ISM),IT,IW1
 2050 FORMAT(' COMPST 2050 TEST: ISM=',I3,2X,'SMOOTH(2,1,ISM)=',
     X G8.3,'  SMOOTH(1,1,ISM)=',G8.3,'  IT=',I3,'  IW1=',I3)
C
         DO 40 I = 2,60,2
            IW2 = 71 - (SMOOTH(2,I,ISM)-0.01)
            WORK(IW1,IW2) = SMOOTH(7,I,ISM)
            WORK(IW1+1,IW2) = SMOOTH(6,I,ISM)
            WORK(  6,  IW2) = SMOOTH(3,I,ISM)
            IF (NDXTOP .EQ. 0) NDXTOP = IW2
            IF (IW2 .GT. NDXBAS) NDXBAS = IW2
            IF (SMOOTH(20,I,ISM).LE. -0.5) GO TO 42
C *** TEST
C     WRITE(6,2040) IW2,NDXTOP,NDXBAS
 2040 FORMAT(' COMPST 2040 TEST:  IW2=',I3,'  NDXTOP=',I3,
     X '  NDXBAS=',I3)
   40       CONTINUE
   42   CONTINUE
   50 CONTINUE
      NLVLS = NDXBAS - NDXTOP + 1
      IF (NLVLS .LE. 1) GO TO 900
C
C *** TEST STATEMENTS
      WRITE (IMES,2060) NDXTOP,NDXBAS,NLVLS,
     X                  ((WORK(I,J),I=1,20),J=NDXTOP,NDXBAS)
 2060 FORMAT('1COMPST 2060: WORK  NDXTOP,NDXBAS,NLVLS',3I4,/(1X,F3.0,
     X F4.0,1X,G8.3,1X,G8.3,F5.1,
     X F5.1,1X,G7.2,F5.1,1X,G7.2,F5.1,1X,G7.2,F5.1,1X,G7.2,F5.1,1X,G7.2,
     X F5.1,1X,G7.2,F5.1,1X,G7.2,F5.1))
C
C CALCULATE COMPOSITE OZONE DENSITY PROFILE AND ERRORS (1 STD. DEV.)
C USING S3, S2, S1, AND S0 BUT NOT THE RATIOS.
C
      DO 100 I = NDXTOP,NDXBAS,1
   60   DMX  = 0.0
        DMN = 1000.
        SUMD = 0.0
        SUMR = 0.
        WORK(1,I) = 0.0
        DO 70 J = 8,14,2
          R = WORK(J,I)
          IF (R .LE. 0.0) GO TO 70
          D = WORK(J-1,I)
          SUMD = SUMD + D/R
          SUMR = SUMR + 1./R
          IF (D .GT. DMX) DMX = D
          IF (D .LT. DMN) DMN = D
          WORK(1,I) = WORK(1,I) + 1.
   70     CONTINUE
        IF (SUMD .LE. 0.0) GO TO 100
        WORK (3,I) = SUMD/SUMR
        WORK (5,I) = 1./SUMR
        WORK(4,I) = CONR * WORK(3,I)
```

```
  100   CONTINUE                                                        00001350
C                                                                       00001670
      GO TO 999                                                         00001680
C                                                                       00001690
C ODDS AND ENDS - ONLY ONE ALTITUDE LEVEL                                00001700
  900 WRITE(IMES,2900) NLVLS,NDXTOP,NDXBAS,WORK(2,NDXTOP),WORK(2,NDXBAS)00001710
 2900 FORMAT('OCOMPST 2900: ONLY',I7,' AVAILABLE, BETWEEN INDICES',2I8, 00001720
     X ' ALTITUDES:',2F6.1,'.  COMPOSITE PROFILE NOT COMPUTED.')        00001730
      NCODE = -22                                                       00001740
C                                                                       00001750
  999 RETURN                                                            00001760
      END                                                               00001770

*** END OF MEMBER ***    146 RECORDS PROCESSED   ***********************************************************************
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```
      SUBROUTINE DATSND(DLAT,NCODE,IMES)
C
C REED/BATLUCK/COOKE   FEB. 1983
C
C SONDE COMPUTES PRESSURES AND DENSITIES AS A FUNCTION OF ALTITUDE,
C   GIVEN TEMPERATURES VS  ALTITUDE, A PRESSURE AT A BASE ALTITUDE, AND
C   LATITUDE, USING P=PB*EXP(-G*M*(H-HB)/(R*T))
C   R=8314.32; M=28.964 AS GIVEN IN U.S. STD. ATM, 1976
C   G = 9.806160 M/S**2 AT 0. ALT AND 45. LAT
C     AT LAT=PHI,G(PHI)=G*(1-2.6373E-3*COS(2*PHI)+5.9E-6*
C      (COS(2*PHI))**2)
C      VALUE OF G AND LAT. CORR. FROM LIST,R.J., SMITHSONIAN
C      METEOROLOGICAL TABLES, 6 ED., 1968,P 488.
C      AT ALT (H), G=G(PHI) * (RO/(RO+H))**2, WHERE
C      RO = 6378388. * (1-3.367E-03)*(SIN(LAT))**2+7.1E-6*(SIN2*LAT))**2
C      (BASIC PHYSICS OF THE SOLAR SYSTEM, BLANCO & MCCUSKEY,1961,P 83)
C      DENSITY(KG/M3) = P(MBAR)*M/(R*T*100.)
C   IF A DATASONDE FLIGHT IS NOT AVAILABLE, THEN TEMPERATURE PROFILE
C   AND A BASE PRESSURE SHOULD BE TAKEN FROM  U.S. STD ATMOSPHERE
C   SUPPLEMENTS, 1966, OR OTHER LAT - SEASONAL MODEL
C
C      SONDE (1,X) = ALTITUDE        (KM)
C      SONDE (2,X) = AIR TEMPERATURE (KELVIN)
C      SONDE (3,X) = AIR PRESSURE    (MBAR)
C      SONDE (4,X) = AIR DENSITY     (KG/M3)
C      SONDE (5,X) = ERROR IN AIR TEMP (KELVIN)
C
C      NCODE       = -5 FAILED TO COMPUTE PRESSURES AND DENSITIES
C
C      DSB(1)      = BASE ALTITUDE (KM)
C      DSB(2)      = BASE TEMPERATURE (K)
C      DSB(3)      = BASE PRESSURE (MBAR)
C
      COMMON/PROFLS/DSB(3),MXSND,NECC(2),ECCLM(3,2),SONDE(5,70),
     X ECC(4,19,2),STD(3,60)
      COMMON/CONSTT/AVOGAD,VOLSTP,RSTAR,DGTORD,GRV45,AIRM,GRV,RZRO
      NCODE = 0
C  * 2 TO OBTAIN AVERAGE TEMP AND * 1000. TO CONVERT DELTA H TO M.
      CON = 2000.*AIRM/RSTAR
C  COMPUTE GRAVITY AND EARTH RADIUS AT LATITUDE OF LAUNCH SITE
      RLAT = DLAT*DGTORD
      TM = COS(2*RLAT)
      GRV = GRV45*(1.-2.6373E-3*TM+5.9E-6*TM*TM)
      TM = SIN(RLAT)
      TMA = SIN(2*RLAT)
      RZRO = 6378.388*(1.-3.367E-3*TM*TM+7.1E-6*TMA*TMA)
C  FIND INDEX CORRESPONDING TO BASE ALTITUDE
      DO 50 I = 1,MXSND
      INDB = I
      IF(ABS(SONDE(1,I) - DSB(1)).LT.0.01) GO TO 60
   50 CONTINUE
      INDB = MXSND + 1
      DO 52 I = 1,MXSND
        INDB = INDB - 1
        IF (DSB(1) .LT. SONDE(1,INDB)) GO TO 54
   52   CONTINUE
```

```
      GO TO 990                                                         00000462
C COMPUTE VALUES AT LEVEL ABOVE DSB. ALT                                00000464
   54 R = RZRO/(RZRO+SONDE(1,INDB))                                     00000466
      SONDE(3,INDB) = DSB(3) * EXP(-GRV *R*R*CON*(SONDE(1,INDB)-DSB(1)) 00000468
     X  /(SONDE(2,INDB)+DSB(2)))                                        00000470
      GO TO 65                                                          00000472
C  COMPUTE PRESSURE AS A FUNCTION OF ALTITUDE, ABOVE AND BELOW BASE.    00000486
   60 SONDE(3,INDB) = DSB(3)                                            00000490
C *** TEST STATEMENT                                                    00000501
C     WRITE(IMES,2000) AVOGAD,VOLSTP,RSTAR,DGTORD,GRV45,AIRM,GRV,       00000502
C    X                 RZRO,R,CON,DLAT                                  00000503
C2000 FORMAT(/,1X,'AVOGAD = ',E10.3,'  VOLSTP = ',F8.3,'  RSTAR = ',    00000504
C    X F8.3,'  DGTORD = ',F8.3,'  GRV45 = ',F8.3,'  AIRM = ',F8.3,      00000505
C    X '  GRV = ',F8.3,/,1X,'RZRO = ',F8.3,'  R = ',F8.3,'  CON = ',    00000506
C    X F8.3,'  DLAT = ',F8.3)                                           00000507
   65 J = INDB                                                          00000509
      DO 70 I = 2,INDB                                                  00000510
      K = J-1                                                           00000520
      R = RZRO/(RZRO+SONDE(1,K))                                        00000530
      SONDE(3,K)=SONDE(3,J)*EXP(-GRV*R*R*CON*(SONDE(1,K)-SONDE(1,J))    00000548
     X /(SONDE(2,K)+SONDE(2,J)))                                        00000550
```

```
   70 J = J-1
      LIM = MXSND-1
      J = INDB
      IF (LIM.LE.INDB) GO TO 85
      DO 80 I = INDB,LIM
      K = J+1
      R =  RZRO/(RZRO+SONDE(1,K))
      SONDE(3,K)=SONDE(3,J)*EXP(-GRV*R*R*CON*(SONDE(1,K)-SONDE(1,J))
     X /(SONDE(2,K) + SONDE(2,J)))
   80 J = J+1
C  COMPUTE DENSITY(KG/M3)
   85 CON = 100. * AIRM / RSTAR
      DO 90 I = 1,MXSND
   90 SONDE(4,I) = CON*SONDE(3,I)/SONDE(2,I)
      GO TO 999
C  ODDS AND ENDS
  990 WRITE(IMES,2990) DSB(1),SONDE(1,1),SONDE(1,MXSND)
 2990 FORMAT('0SONDE 2990: BASE ALTITUDE,',F7.1,', NOT WITHIN RANGE ',
     X 'OF DATASONDE:',2F7.1)
      NCODE = -5
  999 RETURN
      END
```

*** END OF MEMBER ***   99 RECORDS PROCESSED   **

```
      SUBROUTINE INARRY(NCODE,TEMPX,IMES)
C
C REED, COOKE                                 DEC. 1983
C
C INARRY (UNDER PROF.CNTL(DINARRY)) IS A SUBROUTINE USED IN BYPASSING
C THE SUBROUTINE BY THE SAME NAME IN PROF.CNTL(INARRY). IN THIS CASE,
C MCBRIDE COEFFICIENTS ARE SUPPLIED IN DATA5 CARDS INSTEAD OF USING
C FIGURES EXISTING IN V. ZAHNERS DISK FILES.
C
      WRITE(IMES,2000)
 2000 FORMAT('DINARRY 2000: ARRAYS ARE NOT FILLED')
      RETURN
      END
```

*** END OF MEMBER ***   13 RECORDS PROCESSED   **

```
      SUBROUTINE INARRY(NCODE,TEMPK,IMES)
C
C REED, BATLUCK, COOKE          MARCH 1983
C
C SOLAR FLUX, DIFFUSER, DETECTOR, OZONE ABS AND SCATTERING DATA ARRAYS
C   ARE FROM 240.1 TO 340.0 NM. OZONE ABS. AT OTHER TEMP ARE 260.1 TO
C   340.0 NM. ALL ARE PRECEDED BY A 20-WORD HEADER.
C THE INITIAL RECORD OF EACH HAS 64 CHARACTERS FOLLOWED BY 4 R*4 WORDS
C 31-SOLAR FLUX    32-DIFFUSER TR.    33-DETECTOR RESP    34-BETA,RAYLEIGH
C 35-OZ ABS 18C    36-OZ ABS -  C     37-OZ ABS -  C
C
      DIMENSION IRNG(2,7), TEMPK(3), STR(1000,3), HDR(20),ZEROS(100)
      COMMON/COEFTS/GAMM(1000),BETA(1000),ABSZ(1000),ABST(800,2)
      COMMON/DATOUT/NSAV,PED(20,30),SAVE(20,60)
      EQUIVALENCE (GAMM(1),STR(1,1))
C
C INITIALIZE ARRAYS TO ZERO
    5 GAMM(1) = 0.
      CALL CMOVE(GAMM(1),GAMM(2),18396)
C FILL ARRAYS WITH DATA TO BE USED FOR EFFECTIVE OZONE ABSORPTION.
C GAMM WILL CONTAIN THE PRODUCT OF SOLAR FLUX, DIFFUSER TRANSMISSION,
C AND DETECTOR RESPONSIVITY.
C
      DO 20 M = 1,3
      N = M + 30
      READ (N,ERR=905,END=910) HDR,ZEROS,(STR(J,M),J=1,1000)
      WRITE(IMES,2005) N, HDR
 2005 FORMAT ('0INARRY 2005: UNIT',I3,3X,16A4,4F7.1)
C
C
C DETERMINE WAVELENGTH/INDEX RANGE; CONVERT, IF NECESSARY, NM TO A.
   15 IF (HDR(17) .LT. 1000.) HDR(17) = 10. * HDR(17)
      IF (HDR(18) .LT. 1000.) HDR(18) = 10. * HDR(18)
      IRNG(1,M) = (HDR(17) + .001)
      IRNG(2,M) = (HDR(18) + .001)
C PLACE HDR INFO IN PED
      NSAV = NSAV + 1
      PED(1,NSAV) = -507. - M
      CALL CMOVE(HDR(1),PED(2,NSAV),76)
   20 CONTINUE
C
C CALCULATE PRODUCT OF SOLAR FLUX, DIFF TRANSM, AND DETECTOR RESP.
C
      DO 25 I = 1,1000
   25 GAMM(I) = GAMM(I) * BETA(I) * ABSZ(I)
C
C DETERMINE RANGE OF USEFUL DATA IN GAMM
      IA = 1
      IB = 10000
      DO 30 I = 1,3
      IF (IRNG(1,I) .GT. IA) IA = IRNG(1,I)
   30 IF (IRNG(2,I) .LT. IB) IB = IRNG(2,I)
      IF ((IB-IA) .LT. 100) GO TO 915
C
C BRING IN RAYLEIGH SCATTERING COEFF. AND OZONE ABS. COEFF AT ROOM TEMP.
C
```

```
      DO 50 M = 2,3
      N = M + 32
      READ (N,ERR=905,END=910) HDR,ZEROS,(STR(J,M),J=1,1000)
      WRITE (IMES,2005) N, HDR
C
   45 IF (HDR(17) .LT. 1000.) HDR(17) = 10. * HDR(17)
      IF (HDR(18) .LT. 1000.) HDR(18) = 10. * HDR(18)
      K = M + 2
      IRNG(1,K) = HDR(17)
      IRNG(2,K) = HDR(18)
C
      NSAV = NSAV + 1
      PED(1,NSAV) = -509. - M
      CALL CMOVE(HDR(1),PED(2,NSAV),76)
   50 CONTINUE
C
C RANGE LIMITS ; STORE TEMPERATURE
C
      DO 55 I = 4,5
      IF (IRNG(1,I) .OT. IA) IA = IRNG(1,I)
   55 IF (IRNG(2,I) .LT. IB) IB = IRNG(2,I)
```

```
      IF ((IB-IA) .LT. 100) GO TO 915
      TEMPK(1) = HDR(19)
      IF (TEMPK(1) .EQ. 0.0) TEMPK(1) = 300.
C
C BRING IN OZONE ABS COEFFICIENTS AT LOW TEMPERATURES
C
      DO 70 M = 1,2
      N = M + 35
      READ (N,ERR=905,END=910) HDR,ZEROS,ZEROS,ZEROS,(ABST(J,M),J=1,800)
      WRITE (IMES,2005) N, HDR
C
C
   65 IF (HDR(17) .LT. 1000.) HDR(17) = HDR(17) * 10.
      IF (HDR(18) .LT. 1000.) HDR(18) = HDR(18) * 10.
      K = M + 4
      IRNG(1,K) = HDR(17)
      IRNG(2,K) = HDR(18)
      TEMPK(M+1) = HDR(19)
      NSAV = NSAV + 1
      PED(1,NSAV) = -512. - M
      CALL CMOVE(HDR(1), PED(2,NSAV),76)
   70 CONTINUE
C
C PUT TEMPERATURE INTO KELVIN UNITS
C
      DO 80 I = 1,3
   80 IF (TEMPK(I) .LT. 70.) TEMPK(I) = TEMPK(I) + 273.15
C *** TEST STATEMENTS
C     CALL CFTWRT(TEMPK,IRNG,IMES)
      GO TO 999
C
C ODDS AND ENDS
C
C READ ERROR IN DATASET
  905 WRITE (IMES,2905) N
 2905 FORMAT ('0INARRY 2905: READ ERROR ON UNIT',I4)
      NCODE = -12
      GO TO 999
C
C EOF AFTER HEADER
  910 WRITE (IMES,2910) N
 2910 FORMAT('0INARRY 2910: UNEXPECTED EOF AFTER HEADER RECORD ON UNIT',
     XI4)
      NCODE = -13
      GO TO 999
C
C USEFUL RANGE OF TABULAR DATA IS INADEQUATE
  915 WRITE (IMES,2915) IA,IB,IRNG
 2915 FORMAT('0INARRY 2915: SOLAR FLUX, DIFF TRANSM, AND DETECTOR RESP',
     X' IS AVAILABLE ONLY FOR INDICES',2I5,' IRNG:',3(2X,2I5))
      NCODE = -14
      GO TO 999
C
  999 RETURN
      END
```

*** END OF MEMBER *** 132 RECORDS PROCESSED **

```
C SUBROUTINE LINFIT
C
C BOVINGTON, P.R., DATA REDUCTION..., MCGRAW-HILL, 1969, P. 104-5.
C
C PURPOSE
C   MAKE A LEAST-SQUARES FIT TO DATA WITH A STRAIGHT LINE
C      Y = A + B*X
C
C
C USAGE
C   CALL LINFIT(X, Y, SIGMAY, NPTS, MODE, A, SIGMAA, B, SIGMAB, R)
C
C DESCRIPTION OF PARAMETERS
C   X      - ARRAY OF DATA POINTS FOR INDEPENDENT VARIABLE
C   Y      - ARRAY OF DATA POINTS FOR DEPENDENT VARIABLE
C   SIGMAY - ARRAY PF STANDARD DEVIATIONS FOR Y DATA POINTS
C   NPTS   - NUMBER OF PAIRS OF DATA POINTS
C   MODE   - DETERMINES METHOD OF WEIGHTING LEAST-SQUARES FIT
C            +1 (INSTRUMENTAL) WEIGHT(I) = 1./SIGMAY(I)**2
C             0 (NO WEIGHTING) WEIGHT(I) = 1.
C            -1 (STATISTICAL)  WEIGHT(I) = 1./Y(I)
C   A      - Y INTERCEPT OF FITTED STRAIGHT LINE
C   SIGMAA - STANDARD DEVIATION OF A
C   B      - SLOPE OF FITTED STRAIGHT LINE
C   SIGMAB - STANDARD DEVIATION OF B
C   R      - LINEAR CORRELATION COEFFICIENT
C
C SUBROUTINES AND FUNCTION SUBPROGRAMS REQUIRED
C   NONE
C
C **********************************************************************
C
      SUBROUTINE LINFIT(X,Y,SIGMAY,NPTS,MODE,A,SIGMAA,B,SIGMAB,R)
C
      DOUBLE PRECISION SUM, SUMX, SUMY, SUMX2, SUMXY, SUMY2
      DOUBLE PRECISION XI, YI, WEIGHT, DELTA, VARNCE, A, B
      DIMENSION X(1), Y(1), SIGMAY(1)
C
C           ACCUMULATE WEIGHTED SUMS
C
   11 SUM = 0.
      SUMX = 0.
      SUMY = 0.
      SUMX2 = 0.
      SUMXY = 0.
      SUMY2 = 0.
   21 DO 50 I = 1,NPTS
        XI = X(I)
        YI = Y(I)
        IF (MODE) 31, 36, 38
   31   IF (YI) 34, 36, 32
   32   WEIGHT = 1. / YI
        GO TO 41
   34   WEIGHT = 1. / (-YI)
        GO TO 41
   36   WEIGHT = 1.
```

```
      GO TO 41
   38 WEIGHT = 1. / SIGMAY(I)**2
   41 SUM    = SUM    + WEIGHT
      SUMX   = SUMX   + WEIGHT * XI
      SUMY   = SUMY   + WEIGHT * YI
      SUMX2  = SUMX2  + WEIGHT * XI * XI
      SUMXY  = SUMXY  + WEIGHT * XI * YI
      SUMY2  = SUMY2  + WEIGHT * YI * YI
   50 CONTINUE
C
C        CALCULATE COEFFICIENTS AND STANDARD DEVIATIONS
C
   51 DELTA = SUM*SUMX2 - SUMX*SUMX
      A = (SUMX2*SUMY - SUMX*SUMXY) / DELTA
   53 B = (SUMXY*SUM  - SUMX*SUMY ) / DELTA
   61 IF (MODE) 62, 64, 62
   62 VARNCE = 1.
      GO TO 67
   64 C = NPTS - 2
      VARNCE = (SUMY2 + A*A*SUM + B*B*SUMX2
     X -2.0D00*(A*SUMY + B*SUMXY - A*B*SUMX)) / C
```

```
      IF (VARNCE.LT.0.0) VARNCE = 0.0D0                                 00000812
   67 SIGMAA = DSQRT(VARNCE*SUMX2 / DELTA)                              00000820
   68 SIGMAB = DSQRT(VARNCE*SUM   / DELTA)                              00000830
   71 R = (SUM*SUMXY - SUMX*SUMY) /                                     00000840
     X DSQRT(DELTA*(SUM*SUMY2 - SUMY*SUMY))                             00000850
      RETURN                                                            00000860
      END                                                               00000870
```

*** END OF MEMBER ***   84 RECORDS PROCESSED   **

```
      SUBROUTINE MODEL(NCODE)
C
C REED, BATLUCK, AND COOKE       MAR   1983
C BATLUCK, COOKE                 MAY   1984  MODIFIED CODE TO CORRECTLY
C                                            FILL PED ARRAY
C
C MODEL FILLS THE ARRAY, STD., WITH VALUES BASED ON THE KRUEGER-MINZNER
C    MODEL. IT WOULD BE DESIRABLE TO ADJUST THE MODEL PROFILE FOR
C    TOTAL OZONE (FROM DOBSON OBSERVATIONS), AND LATITUDE, BASED,
C    FOR EXAMPLE, ON THE FIRST GUESS TABLES USED IN SBUV DATA
C    REDUCTION.
C
C NCODE = 1 NO PROBLEMS
C STD(1)= ALTITUDE (KM)
C    (2)= OZONE NUMBER DENSITY (MOLECULES/M3)
C    (3)= OZONE OVERBURDEN (ATM-CM)
C
      DIMENSION DKM (31), DKMID(2)
      COMMON/PROFLS/DUMA(12),DUMB(502),STD(3,60)
      COMMON/CONSTT/AVOGAD,VOLSTP,DUMC(6)
      COMMON/DATOUT/NSAV,PED(20,30),SAVE(20,60)
C
C VALUES IN DKM CORRESPOND TO OZONE NUMBER DENSITY AT 10,12,14,..70 KM
C FROM US STD ATMOS., 1976, ALL TO BE MULTIPLIED BY 1.E17
C BUR = OZONE OVERBURDEN ABOVE 70 KM, EST. FROM US STD, 1976.
C
      DATA DKMID/'KRUG','MINZ'/
      DATA DKM /11.3,20.2,23.5,29.5,40.4,47.7,48.6,45.4,40.3,32.4,25.2,
     X 20.3,15.8,12.2,8.73,6.07,3.98,2.74,1.69,1.03,.664,.384,.255,.161,
     X .112,.0733,.0481,.0317,.0172,.0075,.0054/
       CON = 1.E05 * VOLSTP/AVOGAD
      BUR = 5.35E-6
C FILL STD ARRAY, USING 1 KM INTERVALS, DESCENDING FROM 70 AT STD(1,1)
      KM = 71
      K  = 31
      DO 100 I=1,60
      STD(1,I) = KM - I
C OZONE NUMBER DENSITIES
      IF ( (KM-I) .EQ. (2*K+8) ) GO TO 20
      IT = K-1
      STD (2,I) = (DKM(K) + DKM(IT)) * 0.5E17
      K = IT
      GO TO 25
   20 STD (2,I) = DKM(K) * 1.E17
C OZONE OVERBURDENS
   25 IF (I .GT. 1) GO TO 30
      STD (3,1) = BUR
      GO TO 100
   30 IT = I-1
      STD(3,I) = (STD(2,IT) + STD(2,I)) * 0.5 * CON + STD(3,IT)
  100 CONTINUE
C
C PLACE IN PEDIGREE (11,12,13) OZONE DENSITIES FROM STD.
C
      PED(1,11) = -504.
      PED(2,11) = 70.
```

```
      PED(3,11) = -1.
      PED(4,11) = 50.
      PED(5,11) = DKMID(1)
      PED(6,11) = DKMID(2)
      PED(7,11) = KM - 1
      PED(8,11) = BUR
      DO 150 I= 9,20
      J = I-8
  150 PED (I,11)= STD(2,J)
C
      PED (1,12) = -505.
C
      DO 160 I=2,20
      J = I + 11
  160 PED (I,12) = STD (2,J)
C
      PED (1,13) = -505.
C
      DO 170 I=2,20
      J = I + 30
  170 PED (I,13) = STD (2,J)
```

```
26JUL84 08.53.47 - VOL=SACC10, DSN=L3EIR.PROF.CNTL                                MEMBER=MODEL

      PED (1,14) = -505.                                                  00000742
      DO 180 I = 2,11                                                     00000744
      J = I + 49                                                          00000746
  180 PED (I,14) = STD (2,J)                                              00000748
C                                                                         00000750
      NCODE = 1                                                           00000760
      RETURN                                                              00000770
      END                                                                 00000780

*** END OF MEMBER ***     85 RECORDS PROCESSED    ****************************************************************************
```

```
      SUBROUTINE OVERLP (IMES,ICHK)
C
C REED, BATLUCK, AND COOKE                        APRIL 1983
C
C OVERLP CHECKS THE OZONE DENSITIES FOR CONSISTENCY AMONG THE VARIOUS
C PROFILES WHERE THEY OVERLAP IN ALTITUDE, FITTING THE POINTS TO A
C LINEAR REGRESSION; Y = A + BX, WHERE Y IS DENSITY FROM THE LONGER
C WAVELENGTH FILTER.
C
C NPRS   = NUMBER OF PAIRS OF OVERLAPS
C
      DIMENSION HEADS(7),X(30),Y(30),SIGMAY(30)
C
      COMMON/DATOUT/NSAV,NDXTOP,NDXBAS,NLVLS,DM(17),
     X  WORK(20,71), TABLE(10,36)
C
      DATA HEADS/' S3 ',' S2 ',' S1 ',' S0 ','S3/0','S2/0','S1/0'/,
     X  MODE/1/
C
C
      NPRS = 0
      DO 200  IX = 7,17,2
      IT = IX + 2
        DO 100 IY = IT,19,2
        NP = 0
        ALTMX = 0.
        ALTMN = 0.
        IHX = (IX-5)/2
        IHY = (IY-5)/2
          DO 50  L = NDXTOP, NDXBAS
C FIND SET OF OVERLAPPING DATA -
          IF (WORK(1,L) .LE. 1.001 .OR. WORK(IX,L).LE.0. .OR. WORK(IY,L)
     X      .LE.0. ) GO TO 50
          IF((ABS(WORK(IY,L) - WORK(IX,L))/WORK(IY,L)).GT.0.30) GO TO 50
          NP = NP + 1
          IF (NP.LE.30) GO TO 40
          WRITE(IMES,2040) HEADS(IHX),HEADS(IHY),WORK(2,L)
 2040 FORMAT(' OVERLP 2040: IN ANALYSIS OF',A4,' AND',A4,
     X ' ALTITUDES BELOW',F4.0,' ARE IGNORED')
          NP = 30
          GO TO 60
   40     IF (NP .EQ. 1) ALTMX = WORK(2,L)
          X(NP) = WORK (IX,L)
          Y(NP) = WORK (IY,L)
          SIGMAX = WORK(IX+1,L)*X(NP)*0.01
          SIGMAY(NP) = WORK (IY+1,L)*Y(NP)*0.01
          ALTMN = WORK(2,L)
   50     CONTINUE
        IF (NP .EQ. 0) GO TO 100
        IF (NP .GT. 1) GO TO 60
        B = Y(1)/X(1)
        A = 0.
        SIGMAA = 0.
        R = 0.
        SIGMAB=50.*SQRT(SIGMAY(1)*SIGMAY(1)+SIGMAX*SIGMAX)/(X(1)+Y(1))
        GO TO 70
```

```
C LINEAR REGRESSION
   60   CALL LINFIT(X,Y,SIGMAY,NP,MODE,A,SIGMAA,B,SIGMAB,R)
C FILL OUTPUT TABLE
   70   NPRS = NPRS + 1
        TABLE (1,NPRS) = HEADS(IHX)
        TABLE (2,NPRS) = HEADS(IHY)
        TABLE (3,NPRS) = ALTMX
        TABLE (4,NPRS) = ALTMN
        TABLE (5,NPRS) = NP
        TABLE (6,NPRS) = A
        TABLE (7,NPRS) = SIGMAA
        TABLE (8,NPRS) = B
        TABLE (9,NPRS) = SIGMAB
        TABLE(10,NPRS) = R
        IF (NPRS .EQ. 36) GO TO 210
  100   CONTINUE
  200 CONTINUE
      IF (NPRS .EQ. 0) GO TO 990
C
C WRITE OUTPUT TABLE
  210 WRITE (ICHK,2210) MODE,((TABLE(I,J),I=1,10),J=1,NPRS)
```

```
2210 FORMAT ('1OVERLAP ANALYSIS , WITH WEIGHTING MODE =',I2,              00000700
    X'  FILT Y = A + B * FILT X' //' FILT X FILT Y MX ALT MN ALT PAIRS'00000710
    X, '      A        STD DEV A           B      STD DEV B CORREL'//    00000720
    X(3X,A4,2X,A4,2F7.0,F6.0,2X,E11.4,1X,E9.2,2X,F11.4,1X,F9.5,1X,       00000730
    X F7.4))                                                             00000732
     IF (MODE.EQ.1) WRITE(ICHK,2215)                                     00000734
2215 FORMAT('0MODE 1 IS INSTRUMENTAL WEIGHTING, THAT IS, 1/SIGMAY**2') 00000736
     GO TO 999                                                           00000740
 990 WRITE (IMES,2990)                                                   00000750
2990 FORMAT ('0OVERLAP 2990; NO PROFILES OVERLAPPED IN ALTITUDE.')       00000760
 999 RETURN                                                              00000770
     END                                                                 00000780
```

*** END OF MEMBER ***   89 RECORDS PROCESSED   **

```
      SUBROUTINE OVRBRD(ALT, SECANT, SLTOZ, SLTAR, NCODE)
C
C REED, BATLUCK, COOKE             MAR    1983
C
C OVRBRD ESTIMATES THE SLANT PATH OZONE AND AIR MASS BETWEEN THE OBSER-
C     VATION AT ALTITUDE AND THE SUN, USING THE STD OZONE PROFILE AND
C     DATSND AIR PROFILE.
C
C     ALT    = ALTITUDE OF OBSERVATION - KM
C     SECANT= SECANT OF THE SOLAR ZENITH ANGLE, AS GIVEN BY SUBR. SECANG
C     SLTOZ = SLANT COLUMN OF OZONE - ATM-CM
C     SLTAR = SLANT AIR MASS - ATMOSPHERES
C     NCODE = 0  NO PROBLEM
C           = -9 FAILED TO PROVIDE OZONE OVERBURDEN
C           = -10 FAILED TO PROVIDE AIR OVERBURDEN
C           = -11 FAILED TO PROVIDE BOTH
C
C
C
      COMMON/PROFLS/DSBALT,DSBPRS,MXSND,NECC(2),SONDE(5,70),ECC(4,21,2),
     X STD(3,60)
      COMMON/CONSTT/AVOGAD,VOLSTP,RSTAR,DGTORD,GRV45,AIRM,GRV,RZRO,IMES
C
      NCODE = 0
C
C FIND GIVEN ALTITUDE IN STD OZONE PROFILE
      DO 10 I=1,60
      J = I
      IF (ALT - STD(1,I)) 10,20,30
   10 CONTINUE
      GO TO 900
C
C USE OVERBURDEN AT GIVEN ALTITUDE
   20 COLOZ = STD(3,J)
      GO TO 40
C
C INTERPOLATE TO OBTAIN OVERBURDEN
   30 FRAC = (ALT - STD(1,J))/(STD(1,J-1) - STD(1,J))
      COLOZ = STD(3,J) + FRAC * (STD(3,J-1) - STD(3,J))
C
C SLANT OZONE
   40 SLTOZ = COLOZ * SECANT
C
C FIND ALTITUDE IN DATASONDE PROFILE
  100 DO 110 I=1,MXSND
      J = I
      IF (ALT - SONDE(1,I)) 110, 120, 130
  110 CONTINUE
      GO TO 910
C
C FIND DENSITY AT ALT
  120 DENS = SONDE(4,J)
      GO TO 140
  130 FRAC = (ALT - SONDE(1,J))/(SONDE(1,J-1) - SONDE(1,J))
C
      DENS = EXP(ALOG(SONDE(4,J)+ FRAC*(ALOG(SONDE(4,J-1)/SONDE(4,J)))))
```

```
C
C COMPUTE DENSITY SCALE HEIGHT (OPTICS OF THE ATMOS., MCCARTNEY,1976,
C   J. WILEY, P.81)   RG IS ABOUT 29; FOR KM; 29E-3
C
  140 RG = 1.E-3*RSTAR / (AIRM*GRV)
      IF (J .EQ. 1) GO TO 150
      K = J - 5
      IF (K .LE. 0) K = 1
      GAMMA = -(SONDE(2,J) - SONDE(2,K))/(SONDE(1,J) - SONDE(1,K))
      HRHO = RG * SONDE(2,J) /(1 - RG * GAMMA)
      GO TO 160
  150 HRHO = RG * SONDE(2,J)
C
C COMPUTE SLANT AIR MASS; DIVIDE BY STD AIR MASS IN KG/M2, CNVRT
C     HRHO TO M
  160 SLTAR = SECANT * HRHO * DENS / 101.325
      GO TO 990
C
C ODDS AND ENDS
C NO SLTOZ
  900 WRITE (IMES,2900) ALT, STD(1,1), STD(1,J)
```

```
 2900 FORMAT('0OVRBRD 2900: ALTITUDE(',F6.0,') NOT IN RANGE OF PROFILE '
     X,'IN STD:', 2F7.0)
      NCODE = -9
      GO TO 100
C
C NO SLTAR
  910 WRITE (IMES,2910) ALT, SONDE(1,1), SONDE(1,MXSND)
 2910 FORMAT ('0OVRBRD 2910: ALTITUDE(',F6.0,') NOT IN RANGE OF PROFILE'
     X,' IN SONDE:', 2F7.0)
      NCODE = NCODE - 10
      IF (NCODE .LT. -11) NCODE = -11
  996 RETURN
      END
```

*** END OF MEMBER ***   90 RECORDS PROCESSED   **

```
      SUBROUTINE OZDENS(NCODE,IMES,ITBL)
C
C REED, BATLUCK, AND COOKE    APR 1983
C
C OZDENS COMPUTES OZONE DENSITY AND COLUMN CONTENT FOR EACH ALTITUDE
C   LEVEL FOR EACH FILTER, BASED EITHER ON OBSERVED INTENSITIES OR ON
C   THEIR RATIOS TO SO INTENSITY. AFTER THE PROFILE FOR A FILTER IS
C   COMPLETE, THE RESULTS (2 RECORDS PER ALTITUDE LEVEL) ARE WRITTEN
C   ON THE OUTPUT TAPE, AND ALSO MOVED TO THE SMOOTH ARRAY, REPLACING
C   THE INPUT DATA FOR THAT FILTER, THUS KEEPING THE PROFILES AVAILABLE
C   FOR USE BY LATER SUBROUTINES.
C
C THE OZONE DENSITY IS BASED ON THIS FORMULA, EVALUATED WITH DH = 2 KM:
C   DU/DH = -( (LN(IT)-LN(IB))/2 + BEFF(DM/DH))/(AEFF + U * D(AEFF)/DU),
C   ITERATED AS NECESSARY. AN ADJUSTMENT IS MADE TO BETA FOR SCATTERED
C   LIGHT IN THE COMPENSATION CHANNEL, UNLESS RATIO TO SO IS BEING USED.
C
C ARGUMENTS
C   NCODE =  1 NO PROBLEMS
C         =-20 DESIRED ALTITUDE NOT FOUND IN SONDE OR ECC PROFILE.
C         =-21 DESIRED ALTITUDE NOT FOUND IN STD - FOR OZONE COLUMN.
C
C
C SELECTED VARIABLES
C
C  IF      = INDEX FOR FILTER SELECTION CARD BEING PROCESSED    1-7
C  ISM     = LOCATION OF DATA IN SMOOTH - 3RD SUBSCRIPT         1-7
C  LT      = INDEX OF TOP ALTITUDE LEVEL UNDER CONSIDERATION; 2ND SUB-
C            SCRIPT IN SMOOTH   1-57
C  LC      = INDEX FOR CENTER ALTITUDE  2-59
C  LB      = INDEX FOR BOTTOM ALTITUDE  3-60
C  ALTT,ALTC,ALTB = ALTITUDES UNDER CONSIDERATION - KM
C  ASLTT,ASLTC,ASLTB = SLANT AIR MASS - ATMOSPHERES
C  DMDHC   = RATE OF CHANGE OF SLANT AIR MASS
C  UT,UC,UB = SLANT PATH OZONE BETWEEN OBS AND SUN - ATM-CM
C  ALFAT,ALFAC,ALFAB = EFFECTIVE OZONE ABSORPTION
C  BETAT,BETAC,BETAB = EFFFCTIVE SCATTERING COEFFICIENT
C  DELU    = OZONE SLANT COLUMN BETWEEN T AND B
C  ODENC   = OZONE DENSITY AT C  ATM-CM /KM
C  NS      = NUMBER OF RECORDS IN SAVE
C
C
      LOGICAL   FIRST, RATIO
C
      COMMON/SETUP/DUM(6),INCLD(7),TOP(7),BASE(7)
C
      COMMON/PROFLS/DSB(3),MXSND,NECC(2),ECCLM(3,2),SONDE(5,70),
     X              ECC(4,19,2),STD(3,60)
      COMMON/DATAIN/NLAYRS,SECSZA(60),SMOOTH(20,60,7)
C
      COMMON/DATOUT/NSAV,PED(20,30),SAVE(20,60)
C
      COMMON/CONSTT/AVOGAD,VOLSTP,RSTAR,DGTORD,GRV45,AIRM,GRV,RZRO
      DATA BETCMP/0.472/
C
      NSETS = 0
```

```
C LAUNCH HOUR
      HOUR = (INT(PED(5,1)/10000.)) * 10000.
      CONR = 1.E-5 * AVOGAD /VOLSTP
      CONP = 0.1 * RSTAR / VOLSTP
      COND = 100. * AVOGAD/RSTAR
      CONS = 2000. * AIRM/RSTAR
C
C DO LOOP FOR S3, S2, S1, S0,  S3/S0, S2/S0, S1/S0.
      DO 800  IF = 1,7
      RATIO = .FALSE.
C WHAT FILTER IS TO BE PROCESSED?
      IF (INCLD(IF).GT.30 .OR. INCLD(IF).LT.0) GO TO 800
      IF (INCLD(IF).GT.5) RATIO = .TRUE.
      FLTRID = INCLD(IF)
      NS = 0
C FIND START OF THIS FILTER IN SMOOTH
        DO 50 I=1,7
        ISM = I
        IF (ABS(SMOOTH(1,1,I)-FLTRID) .LT. 0.01) GO TO 55
   50   CONTINUE
      WRITE (IMES,1950) INCLD(IF),(SMOOTH(1,1,J),J=1,7)
```

```
 1950 FORMAT('0OZDENS 1950: FILTER ID',I3,' NOT FOUND IN SMOOTH',7F10.0)
      GO TO 800
C FIND INITIAL ALTITUDE LEVEL FOR THIS FILTER
   55 FIRST = .TRUE.
        DO 70 I=1,60
        LT = I
        IF (SMOOTH(2,LT,ISM) .LE. TOP(IF)) GO TO 80
   70   CONTINUE
      WRITE (IMES,1970) TOP(IF), INCLD(IF)
 1970 FORMAT ('0OZDENS 1970: TOP ALTITUDE,',F7.0,' FOR',I3,' NOT FOUND',
     X' IN SMOOTH')
      GO TO 800
C
C DEFINE TOP, CENTER, AND BOTTOM ALTITUDE LEVEL;
C REENTRY FOR SUCCEEDING LEVELS.
   75 LT = LT + 1
      FIRST = .FALSE.
   80 LC = LT + 1
      LB = LT + 2
      IF (LB.GT.NLAYRS .OR. SMOOTH(2,LB,ISM).LT.BASE(IF)) GO TO 800
C
      ALTT = SMOOTH (2,LT,ISM)
      ALTC = SMOOTH (2,LC,ISM)
      ALTB = SMOOTH (2,LB,ISM)
C OBTAIN SLANT AIR MASS AND ITS RATE OF CHANGE
      CALL SLANTA(LT,LC,LB,ALTT,ALTC,ALTB,ASLTT,ASLTC,ASLTB,DMDHC,ISNDC,
     X NCODE,IMES)
C *** TEST STATEMENTS
C     WRITE (IMES,2000) LT,LC,LB,ALTT,ALTC,ALTB,ASLTT,
C    X  ASLTC,ASLTB,DMDHC,ISNDC,NCODE
 2000 FORMAT(/,1X,'OZDENS 2000: LT =',I2,' LC ='I2,' LB =',I2,
     X ' ALTT = ',F6.3,' ALTC = ',F6.3,' ALTB = ',F6.3,' ASLTT = ',
     X G10.3,' ASLTC = ',G10.3,' ASLTB = ',G10.3,/,1X,'DMDHC =',G10.3,
     X ' ISNDC = ',I3,' NCODE = ',I3)
       IF (NCODE .LT. 0) GO TO 900
C
C OBTAIN D(LN(I))/DH FOR TWO KM CENTERED AT C
C
      DLIDH=(ALOG(SMOOTH(3,LT,ISM)) - ALOG(SMOOTH(3,LB,ISM))) * (-0.5)
C
C OBTAIN ESTIMATES OF SLANT PATH OZONE.
      IF (.NOT. FIRST) GO TO 95
C OBTAIN FROM MODEL OZONE PROFILE - GIVEN AT 1 KM INTERVALS.
      DO 90 IX=1,60
C
      IF (STD(1,IX) .NE. ALTT) GO TO 90
      UT = STD(3,IX)   * SECSZA(LT)
      UC = STD(3,IX+1) * SECSZA(LC)
      UB = STD(3,IX+2) * SECSZA(LB)
      GO TO 100
   90 CONTINUE
      GO TO 910
C UPDATE SLANT OVERBURDENS
   95 UT = UC
      UC = UB
      DELCT = UC/SECSZA(LC) - UT/SECSZA(LT)
      UB    = (UC/SECSZA(LC) + DELCT) * SECSZA(LB)
```

```
C
C OBTAIN VALUES FOR EFFECTIVE OZONE ABS. COEFF. AND SCATTERING COEFF.
C
  100 CONTINUE
C *** TEST STATEMENT
C     WRITE (IMES,2050) DLIDH,UT,UC,UB,DELCT
 2050 FORMAT(/,1X,'OZDENS 2050: DLIDH = ',G11.3,' UT = ',G11.3,' UC = ',
     X G11.3,' UB = ',G11.3,' DELCT = ',G11.3)
      IF (.NOT. FIRST) GO TO 104
C
      CALL ALFEFF(IF,ALTT,UT,ASLTT,ALFAT,BETAT,NCODE,IMES,ITBL)
      IF (ALTT .EQ. TOP(IF)) ALFTOP = ALFAT
      IF (NCODE .LT. 0) GO TO 999
      IF (.NOT.RATIO) BETAT = BETAT - BETCMP
      CALL ALFEFF(IF,ALTC,UC,ASLTC,ALFAC,BETAC,NCODE,IMES,ITBL)
      IF (NCODE .LT. 0) GO TO 999
      IF (.NOT.RATIO) BETAC = BETAC - BETCMP
      GO TO 105
C
C UPDATE
  104 ALFAT = ALFAC
```

```
      ALFAC = ALFAB
      BETAT = BETAC
      BETAC = BETAB
      PDELU = 0.0
  105 CALL ALFEFF(IF,ALTB,UB,ASLTB,ALFAB,BETAB,NCODE,IMES,ITBL)
      IF (.NOT.RATIO) BETAB = BETAB - BETCMP
      IF (NCODE .LT. 0) GO TO 999
C
C CALCULATE SLANT OZONE BETWEEN T AND B LEVELS
C
      NI = 0
  106 CONTINUE
C     WRITE (IMES,2106) ALFAT,ALFAC,ALFAB,BETAT,BETAC,BETAB
 2106 FORMAT ('0OZDENS 2106: ALFAT,C,B =',3F13.6,'    BETAT,C,B = ',
     X 3F10.6)
      NI = NI + 1
      DELU = (ALTT - ALTB) *
     X  (DLIDH+BETAC*DMDHC)/(ALFAC+(ALFAT-ALFAB)*UC*0.5)
      DELU = ABS(DELU)
C
C ITERATE?
C
C     WRITE(IMES,2108) DELU,PDELU
 2108 FORMAT('0OZDENS 2108:  DELU =',G12.4,2X,'PDELU =',G12.4)
      IF (ABS((DELU-PDELU)/DELU) .LT. 0.001) GO TO 110
      IF (NI .LT. 4) GO TO 109
      WRITE(IMES,2109) IF,ALTC
 2109 FORMAT(' OZDENS 2109: NUMBER OF ITERATIONS FOR FILTER',I3,
     X ' AT',F4.0,' KM IS 4.  GO TO NEXT FILTER.')
      GO TO 150
  109 PDELU = DELU
C RECOMPUTE UB, ALFAC, BETAC
      UB = UT + DELU
      CALL ALFEFF(IF,ALTB,UB,ASLTB,ALFAB,BETAB,NCODE,IMES,ITBL)
      IF (.NOT.RATIO) BETAB = BETAB - BETCMP
      IF (NCODE .LT. 0) GO TO 999
      ALFAC = 0.5 * (ALFAT + ALFAB)
      BETAC = 0.5 * (BETAT + BETAB)
      GO TO 106
C ITERATION COMPLETE
  110 UC = UT + 0.5 * DELU
C OZONE DENSITY AT C IN ATM-CM
      ODENC = 0.5 * DELU / SECSZA(LC)
C
C
C PLACE DATA IN OUTPUT ARRAY SAVE. UPON COMPLETION OF A FILTER, THESE
C   ARE TO BE WRITTEN ON TAPE AND ALSO SAVED IN SMOOTH, OVERWRITING
C   SMOOTH DATA FOR THAT FILTER, FOR USE BY OTHER SUBROUTINES IN
C   PROFILE.
C
      NS = NS + 1
C
      SAVE (1,NS) = 100. + SMOOTH(1,1,ISM)
      SAVE (2,NS) = ALTC
      SAVE (3,NS) = SMOOTH (10,LC,ISM)
      SAVE (4,NS) = SECSZA (LC)
      SAVE (5,NS) = SMOOTH (3,LC,ISM)
```

```
      SAVE (6,NS) = UC
      SAVE (7,NS) = ASLTC
      SAVE (8,NS) = ALFAC
      SAVE (9,NS) = BETAC
      SAVE(10,NS) = DLIDH
      SAVE(11,NS) = (ALFAT-ALFAB) * 0.5 / UC
      SAVE(12,NS) = DMDHC
      SAVE(13,NS) = ALFAC * UC
      SAVE(14,NS) = BETAC * ASLTC
C
C
C FRASER CORRECTION IS AN ESTIMATE OF THE LIGHT SCATTERED OUT OF PATH
C   TO THE SUN:  I(NO LOSS)(1-F) = I(OBSERVED)   FROM R.S. FRASER, GSFC.
C   SEE THOMAS ET AL., APPL. OPT. 21,2436,JULY 1,1982.
C
      SAVE (15,NS) = 0.376 * ((SECSZA(LC))**0.874)/10.**(ALTC/16.)
C
C ESTIMATE NOISE (1 SD) IN D(LN(I)
C
      ERRTT= SMOOTH(15,LT,ISM)**2+(SMOOTH(17,LT,ISM)*(ALTT-SMOOTH(12,LT,
     XISM)))**2
```

```
C
      ERRBB= SMOOTH(15,LB,ISM)**2+(SMOOTH(17,LB,ISM)*(ALTB-SMOOTH(12,LB,
     XISM)))**2
C
      SAVE (16,NS) = SQRT(ERRTT+ERRBB)
      SAVE (17,NS) = SMOOTH(11,LT,ISM) - SMOOTH(12,LB,ISM)
      SEC = SMOOTH(6,LC,ISM)
      SAVE (18,NS) = SMOOTH (16,LC,ISM)
      SAVE (19,NS) = SMOOTH (17,LC,ISM)
      SAVE (20,NS) = SMOOTH ( 7,LC,ISM)
C *** TEST STATEMENTS
C     WRITE(IMES,2110) (L,L=1,20)
 2110 FORMAT(/,1X,' SAVE = (IN COLUMN,ROW ORDER)',/,4X,'NS',9X,
     X 9(I2,10X),I2,/,5X,10(10X,I2))
C     WRITE(IMES,2112) NS,(SAVE(L,NS),L=1,20)
 2112 FORMAT(1X,I5,2X,10(G10.4,2X),/,11X,10(G10.3,2X))
C
C FILL SECOND RECORD FOR THIS LEVEL
      LNS = NS
      NS = NS + 1
      SAVE (1,NS) = SAVE (1,LNS) + 100.
      SAVE (2,NS) = ALTC
C ASSUME RADAR ERROR IS 20 M. +,- 10 M.  (A. HOLLAND   4-19-83)
      SAVE (3,NS) = 2./ ALTC
      SAVE (4,NS) = HOUR + 100*(AINT(SEC/60.)) + AMOD(SEC,60.)
      SAVE (5,NS) = SMOOTH (5,LC,ISM)
      SAVE (6,NS) = 100.* ((SAVE(16,LNS)/SAVE(10,LNS))**2 + 0.5E-4)**0.5
      SAVE (7,NS) = ODENC
      SAVE (8,NS) = ODENC * CONR
      SAVE (9,NS) = UC / SECSZA(LC)
      SAVE(10,NS) = CONR * SAVE(9,NS) * 1000.
C
      IF (ISNDC .EQ. 0) GO TO 120
      LISNDC = ISNDC
      PALT = ALTC
      SAVE (11,NS) = SONDE(2,ISNDC)
      SAVE (12,NS) = 100. * SONDE(5,ISNDC)/SONDE(2,ISNDC)
      SAVE (13,NS) = SONDE(3,ISNDC)
C ASSUME 1.0 MBAR ERROR IN BASE PRESSURE.
      SAVE (14,NS) = ((100./DSB(3))**2 + SAVE(12,NS)**2)**0.5
      GO TO 140
C
C FIND AIR TEMPERATURE AND PRESSURE IN ECC NO. 1.
C
  120 N = NECC(1)
      DO 130 K = 1,N
      I  = NECC(1) - K + 1
      Z1 = ECC (1,I,1)
      IF (ALTC .GT. Z1) GO TO 130
      J = I - 1
      Z2 = ECC (1,J,1)
      GO TO 135
  130 CONTINUE
  135 RAT = (Z1-ALTC) / (Z1-Z2)
C
C TEMPERATURE; ASSUME ERROR IS TWO DEGREES
      SAVE(11,NS) = ECC(2,I,1) - (ECC(2,I,1)-ECC(2,J,1)) * RAT
```

```
      SAVE(12,NS) =  200./SAVE(11,NS)
C PRESSURE ; ERROR IS ASSUMED TO BE 0.7 MBAR
      SAVE(13,NS) = EXP(ALOG(ECC(3,I,1)) -
     X (ALOG(ECC(3,I,1)) - ALOG(ECC(3,J,1))) * RAT)
      SAVE(14,NS) =  70. /SAVE(13,NS)
C  STORE T,P,D IN SONDE FOR LATER USE
      ISNDC = LISNDC + PALT - ALTC
      SONDE(1,ISNDC) = ALTC
      SONDE(2,ISNDC) = SAVE(11,NS)
      SONDE(3,ISNDC) = SAVE(13,NS)
      SONDE(4,ISNDC) = CONS*SONDE(3,ISNDC)/SONDE(2,ISNDC)
      SONDE(5,ISNDC) = 2.0
C
C DERIVED UNITS
C
  140 SAVE (15,NS) = COND * SAVE(13,NS)/SAVE(11,NS)
      SAVE (16,NS) = ASLTC/SECSZA(LC)
      SAVE (17,NS) = CONP * SAVE(11,NS) * SAVE(7,NS)
      SAVE (18,NS) =  SAVE(17,NS) / SAVE(13,NS)
      SAVE (19,NS) = SEC
      SAVE (20,NS) = NS
```

```
C *** TEST STATEMENTS
C     WRITE(IMES,2110) (L,L=1,20)
C     WRITE(IMES,2112) NS,(SAVE(L,NS),L=1,20)
C
C NEXT ALTITUDE LEVEL OR PLACE THIS FILTER'S PROFILE IN SMOOTH & ON
C   TAPE.
      IF (ALFAC .LT. 0.3*ALFTOP) BASE(IF) = ALTB
      IF (NS .EQ. 60) GO TO 150
      IF (ALTB .GT. BASE(IF)) GO TO 75
  150 SAVE (20,NS) = -1.
      NSETS = NSETS + 1
      NBYTS = NS*20*4
      CALL CMOVE(SAVE(1,1),SMOOTH(1,1,ISM),NBYTS)
      NSAV = NS
      CALL TAPWRT(2,IMES)
C *** TEST STATEMENT
C     CALL PRTSAV(NS,IMES)
C
C READY TO LOOK FOR NEXT FILTER'S DATA
  800 CONTINUE
      NCODE = 1
      GO TO 999
C
C ODDS AND ENDS
C
C PRESSURE DATA NOT AVAILABLE FOR COMPUTATION OF AIR MASS
C   EXPLANATIONS GIVEN BY SLANTA WHERE NCODE IS SET TO -20
  900 GO TO 999
C OZONE OVERBURDEN NOT FOUND IN MODEL (STD)
  910 WRITE(IMES,2910) ALTT
 2910 FORMAT ('0OZDENS 2910: OZONE COLUMN NOT FOUND IN STD FOR ALT=',
     XF6.0)
      NCODE = -21
C
  999 RETURN
      END
```

*** END OF MEMBER ***   347 RECORDS PROCESSED   **

```
C  MAIN - PROFILE
C
C  REED/BATLUCK   MARCH     1983
C
C  PROFILE (1) ASSEMBLES THE ROCOZ OBSERVATIONS,CALIBRATIONS,CORREL-OBS.
C      (SUBROUTINES CARDS, TAPE, INARRY)
C  (2) COMPUTES DERIVED DATA
C      (SUBROUTINES MODEL, DATSND, SECANG, OVRBRD, ALFEFF, SLANTA)
C  (3) COMPUTES OZONE DENSITIES FROM THE ROCOZ ; EVALUATES ROCOZ RESULTS
C      (SUBROUTINES OZDENS, COMPCH)
C  (4) COMBINES ROCOZ O3 WITH CORREL OBS; PUTS RESULTS ON TAPE, PRINT,
C       AND PLOT
C      (SUBROUTINES RELATD, TAPWRT, PRTWRT, PLTWRT)
C
C
      REAL*8 TAPEIN, TAPOUT
C
C TAPE LOCATIONS, TAPE FILES, ALT. RANGE FOR EACH OF THE 4 FILTERS.
      COMMON/SETUP/ TAPEIN,TAPOUT,NFIN,NFOT,INCLD(7),TOP(7),BASE(7)
C
C DATA SONDE, ECC, AND MODEL PROFILES; DESCRIBED IN CARDS.
      COMMON/PROFLS/DSB(3),MXSND,NECC(2),ECCLM(3,2),SONDE(5,70),
     X              ECC(4,19,2),STD(3,60)
C
C FILTER SHAPES AS GIVEN BY MCBRIDE, NWC, CHINA LAKE, CA.
      COMMON/FSHAPE/CH(7),BH(7),CMCBRD(4,7)
C
C MISCELLANEOUS CONSTANTS -
      COMMON/CONSTT/AVOGAD,VOLSTP,RSTAR,DGTORD,GRV45,AIRM,GRV,RZRO
C
C INPUT DATA FROM ROCOZ
      COMMON/DATAIN/NLAYRS,SECSZA(60),SMOOTH(20,60,7)
C
C OUTPUT ARRAYS
      COMMON/DATOUT/ NSAV,PED(20,30),SAVE(20,60)
      DATA IMES/9/,IECHO/6/,ICHK/6/,ITBL/6/
C
C INITIALIZATION
      AVOGAD = 6.022169E26
      VOLSTP = 22.4136
      RSTAR  = 8314.32
      DGTORD = 1.745329E-2
      GRV45  = 9.806160
      AIRM   = 28.9644
      NCODE  = 0
      NSAV   = 0
      CALL CMOVE(NSAV,PED(1,1),7200)
      DSB(1) = 0.
      CALL CMOVE(DSB(1),DSB(2),2772)
      NLAYRS = 0
      CALL CMOVE(NLAYRS,SECSZA(1),33840)
C
C READ AND SETUP INPUT DATA
      CALL CARDS(NCODE,IMES,IECHO)
    9 IF (NCODE) 905,10,10
   10 CALL TAPE(NCODE,IMES)
```

```
      IF (NCODE) 910,20,20                                               00000620
   20 CALL MODEL(NCODE)                                                  00000630
C**** TEST STATEMENTS                                                    00000640
C     CALL PRTPRF(IMES)                                                  00000660
      IF (NCODE) 915,30,30                                               00000670
   30 CALL DATSND(PED(6,1),NCODE,IMES)                                   00000680
C**** TEST STATEMENTS                                                    00000690
      CALL PRTPRF(ITBL)                                                  00000710
      IF (NCODE) 920,35,35                                               00000720
   35 PED(11,7) = GRV                                                    00000730
      PED(12,7) = RZRO                                                   00000740
C                                                                        00000750
COMPUTE SECANT/CHAPMAN-FUNCTION FOR SOLAR ZENITH ANGLES                  00000760
      CALL SECANG(IMES)                                                  00000770
C                                                                        00000800
C                                                                        00000830
COMPUTE AN OZONE PROFILE FOR EACH FILTER AND/OR FILTER RATIO.            00000840
      CALL OZDENS(NCODE,IMES,ITBL)                                       00000850
      IF (NCODE .LT. 0) GO TO 990                                        00000860
      CALL DATWRT(ITBL)                                                  00000862
C                                                                        00000870
```

```
COMPUTE COMPOSITE OZONE PROFILE BASED ON ROCOZ DATA.
      CALL COMPST(NCODE,IMES)
      IF (NCODE .LT. 0) GO TO 996
C
CHECK ROCOZ DATA FOR INTERNAL CONSISTENCY, COMPLETE COMPOSITE TABLE.
      CALL CHECKS(NCODE,IMES,ICHK)
      CALL CMPWRT(ITBL)
C COMPLETE COMPOSITE RECORDS. GENERATE TABLES IN DERIVED UNITS.
      CALL RELATD(IMES)
      CALL TP4WRT(ITBL)
      CALL TP5WRT(ITBL)
      CALL TAPWRT(3,IMES)
      GO TO 990
C
C ODDS AND ENDS
  905 WRITE (6,2905)
 2905 FORMAT ('0MAIN 2905:  PROBLEM IN DATA5 INPUT')
      GO TO 990
  910 WRITE (6,2910)
 2910 FORMAT ('0MAIN 2910:  PROBLEM WITH SMOOTH TAPE')
      GO TO 990
  915 WRITE (6,2915)
 2915 FORMAT ('0MAIN 2915:  PROBLEM IN MODEL')
      GO TO 990
  920 WRITE (6,2920)
 2920 FORMAT ('0MAIN 2920:  PROBLEM IN DATSND')
      GO TO 990
  990 WRITE (IMES,2990)
 2990 FORMAT ('0MAIN 2990: PROGRAM END')
      STOP
      END
```

*** END OF MEMBER ***   108 RECORDS PROCESSED   **

```
C ***********************************************************************
C     SUBROUTINE PRTPED                         JUNE, 1983
C     PROGRAMMER:         S. COOKE              JUNE, 1983
C
C     PURPOSE:    TO PRINT OUT THE VARIOUS PEDIGREE RECORDS
C        THAT HAVE BEEN ESTABLISHED.
C
C ***********************************************************************
C
C
      SUBROUTINE PRTPED(ITBL)
      COMMON/DATOUT/ NSAV,PED(20,30),SAVE(20,60)
C
      WRITE(ITBL,2010) NSAV
 2010 FORMAT(' PRTPED 2010:  NSAV = ',I8)
      IF (NSAV .GT. 90) NSAV = 90
      DO 100 J = 1,NSAV
        IF (PED(1,J).EQ.-504. .OR. PED(1,J).EQ.-505.) GO TO 80
        IF (PED(1,J).LE.-508.) GO TO 90
        WRITE (ITBL,2000) (PED(I,J),I=1,20),PED(5,J),PED(6,J)
        IF (J.EQ.1.) WRITE(ITBL,2001) (PED(K,1),K=10,12)
 2001   FORMAT ('+',120X,3A4)
        GO TO 100
   80   WRITE (ITBL,2080) (PED(I,J),I=1,20),PED(5,J),PED(6,J)
 2080   FORMAT (1X,F5.0,10E12.3,/,2X,9E12.3,2X,A4,1X,A4)
        GO TO 100
   90   WRITE(ITBL,2090) (PED(I,J),I=1,20)
 2090 FORMAT(1X,F5.0,16A4,3F9.2)
  100   CONTINUE
 2000 FORMAT (1X,F5.0,10F12.3/,
     X          2X,9F12.3,2X,2A4)
      RETURN
      END
```

*** END OF MEMBER ***   33 RECORDS PROCESSED   ***

```
      SUBROUTINE PRTPRF(IMES)
C
C REED/COOKE              JULY 1983
C
C PRTPRF PRINTS OUT THE CONTENTS OF  COMMON/PROFLS.
C
C
      COMMON/PROFLS/DSB(3),MXSND,NECC(2),ECCLM(3,2),SONDE(5,70),
     X ECC(4,19,2),STD(3,60)
C
C PRINT OUT DSB ARRAY, MXSND, AND NECC ARRAY.
      WRITE (IMES,2000) DSB,MXSND,NECC
 2000 FORMAT(/,1X,' DSB =    ',F12.3,' KM',F12.3,' K',F12.3,' MBAR'//,
     X         1X,' MXSND = ',5X,I5,//,
     X         1X,' NECC =  ',5X,I5,3X,I5,/)
C
C PRINT OUT ECCLM ARRAY
      WRITE (IMES,2010) ((ECCLM(I,J),I=1,3),J=1,2)
 2010 FORMAT (1X,' ECCLM AT       250          125          62.5 MBAR'/,
     X        10X,3F12.3,/,10X,3F12.3,/)
C
C PRINT OUT SONDE ARRAY.
      WRITE (IMES,2020)
 2020 FORMAT (1X,' SONDE = ',//,
     X        12X,'ALT',8X,'TEMP',8X,'PRESS',7X,'DENS',9X,'ERR K',/)
      DO 50 J = 1,70
         WRITE (IMES,2025) J,(SONDE(I,J),I=1,5)
 2025    FORMAT (1X,I2,2X,3F12.3,2X,E11.4,F12.3)
   50    CONTINUE
C
C PRINT OUT ECC ARRAY.
      WRITE (IMES,2030)
 2030 FORMAT(//,1X,' ECC = ',//,
     X        29X,'(1)',55X,'(2)',//,
     X        14X,'ALT',7X,'TEMP',8X,'PRESS',9X,'O3',22X,'ALT',7X,
     X            'TEMP',8X,'PRESS',9X,'O3',/)
      DO 60 J=1,19
         WRITE (IMES,2035) J,(ECC(I,J,1),I=1,4),J,(ECC(I,J,2),I=1,4)
 2035    FORMAT (4X,I2,4F12.3,10X,I2,4F12.3)
   60    CONTINUE
C
C PRINT OUT STD ARRAY.
      WRITE (IMES,2040)
 2040 FORMAT (//,1X,' STD =',//,
     X        9X,'ALT',10X,'O3/M3',6X,'ATM-CM',/)
      DO 70 J=1,60
         WRITE (IMES,2045) J,(STD(I,J),I=1,3)
 2045    FORMAT (2X,I2,1X,3G12.3)
   70    CONTINUE
      RETURN
      END
```

*** END OF MEMBER ***   51 RECORDS PROCESSED   **

```
      SUBROUTINE PRTSAV(NS,IMES)
C
C COOKE,REED                AUG 1983
C
C PRTSAV PRINTS OUT THE VALUES FOR THE 'SAVE' ARRAY AFTER EACH
C FILTER. (ARRAY IS PRINTED OUT IN COLUMN,ROW ORDER)
C
      COMMON/DATOUT/ NSAV,PED(20,30),SAVE(20,60)
C
      GO TO 200
   50 WRITE (IMES,2100)
 2100 FORMAT(/,5X,'PRTSAV 2100:  SAVE = (IN COLUMN,ROW ORDER)')
      WRITE (IMES,2105) (N1,N1=1,20)
 2105 FORMAT(//,1X,'NS',7X,I2,10X,I2,8X,I2,10X,I2,9X,I2,8X,I2,10X,I2,
     X 12X,I2,10X,I2,9X,I2,/,10X,I2,10X,I2,8X,I2,10X,I2,9X,I2,8X,I2,10X,
     X I2,12X,I2,10X,I2,9X,I2,/)
      DO 100 J = 1,NS,2
      L = J + 1
C PRINT OUT THE ODD NUMBERED ARRAYS
      WRITE (IMES,2110) J,(SAVE(I,J),I=1,20)
 2110 FORMAT(1X,I2,7X,F4.0,8X,F3.0,5X,F6.1,6X,F6.3,5X,F6.1,2X,G10.4,2X,
     X G10.4,6X,F6.1,6X,F6.3,2X,G10.4,/
     X 10X,F4.0,2X,G9.3,5X,F6.3,3X,G9.3,2(2X,G9.3),7X,F5.2,2X,G10.3,
     X 3X,F9.3,7X,F5.1)
C PRINT OUT THE EVEN NUMBERED ARRAYS
      WRITE (IMES,2210) L,(SAVE(I,L),I=1,20)
 2210 FORMAT(1X,I2,7X,F4.0,8X,F3.0,2X,G9.4,2X,G10.4,6X,F5.2,6X,F6.3,
     X 3X,G9.4,3(2X,G10.4),/
     X 10X,F4.0,6X,F5.2,5X,F6.3,7X,F5.2,2X,G9.3,3(3X,G9.3),7X,F5.0,7X,
     X F5.1)
  100 CONTINUE
C
C
  200 FILTER = SAVE(1,1) - 100.
      WRITE (IMES,2300) FILTER
 2300 FORMAT('1PRTSAVE 2300: DATA FROM FILTER ',F3.0/)
      WRITE (IMES,2301)
 2301 FORMAT(' ALT HR× HHMMSS.S  SZA OZR× ATM-CM/KM OZ NUM/M3 OZATM-',
     X 'CM OZNUM/M2 AIRK TR×  AIR MBAR PR× AIRNUM/M3 AIRCOLUM ',
     X 'OZ   NBAR VOL MXR      SEC')
      DO 300 I = 2,60,2
      WRITE (IMES,2302)  (SAVE(J,I),J=2,19)
 2302 FORMAT(1X,F3.0,F4.1,F9.1,F5.1,F5.1,1X,G9.4,1X,G9.4,1X,G8.3,1X,
     X G8.3,F5.0,F4.1,1X,F9.5,F4.1,1X,G9.4,1X,G8.3,1X,G9.4,1X,G8.3,F6.0)
      IF (SAVE(20,I) .LE. 0.) GO TO 310
  300 CONTINUE
  310 WRITE (IMES,2311)
 2311 FORMAT('0ALT COMP SCNT CNT/RAT  SLANTOZ  SLNTAR ALFAEFF BETAF ',
     X' DLNIDH  DALFDU DAIR/DH TAUZ TAUAR   FRASER    NOISE  DH',
     X' BSMOOTH    STDEV PHTMP')
      DO 320 I = 1,59,2
      WRITE (IMES,2312) (SAVE(J,I),J=2,20)
 2312 FORMAT(1X,F3.0,F5.0,F5.2,F8.3,1X,G8.3,1X,G7.2,F8.3,F6.3,F9.5,1X,
     X G6.2,1X,G7.2,F5.2,F6.3,1X,F8.3,1X,F8.3,F4.1,F8.5,F8.5,F5.0)
      IF (SAVE(20,I+1) .LE. 0.) GO TO 999
  320 CONTINUE
```

```
  999 RETURN                                                        00000700
      END                                                           00000710

*** END OF MEMBER ***     58 RECORDS PROCESSED   ********************************************************************
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```
C
C ******************************************************************
      SUBROUTINE PRTSMT(NLAYRS,IMES)
C
C  REED/BATLUCK/COOKE          JUNE 1983
C
C ARGUMENTS
C   N      NUMBER OF HEIGHT LEVELS
C   IMES   OUTPUT TAPE UNIT NUMBER
C
C **************************************************************
      DIMENSION ARR(6), BRR(15)
      COMMON/DATAIN/NLAYRS,SECSZA(60),SMOOTH(20,60,7)
C
C PRINT COMMON PARAMETERS
      WRITE(IMES,2000)
      DO 20 J = 1,NLAYRS
      ARR(1) = SMOOTH(2,J,1)
      ARR(2) = SMOOTH(6,J,1)
      ARR(3) = SMOOTH(5,J,1)
      ARR(4) = SMOOTH(7,J,1)
      ARR(5) = SMOOTH(8,J,1)
      ARR(6) = SMOOTH(9,J,1)
      WRITE(IMES,2010)ARR
   20 CONTINUE
C PRINT DATA FOR EACH FILTER: S3,S2,S1 AND S0
C
      DO 50 KF = 1,7
      K=KF
      NFIL = SMOOTH(1,1,K)
      WRITE(IMES,2050) NFIL
      IF(NFIL.GT.5) WRITE(IMES,2051)
      WRITE(IMES,2060)
      DO 50 J = 1,NLAYRS
      BRR(1) = SMOOTH (2,J,K)
      BRR(2) = SMOOTH (3,J,K)
      BRR(3) = SMOOTH (4,J,K)
      BRR(12) = SMOOTH (11,J,K)
      BRR(13) = SMOOTH (12,J,K)
      BRR(7) = SMOOTH (14,J,K)
      BRR(9) = EXP(SMOOTH (15,J,K))
      IF(BRR(9).NE.0.) BRR(9)=(BRR(9)-1.)*100.
      BRR(8) = (BRR(9)*BRR(7))*0.01
      BRR(10) = SMOOTH (16,J,K)
      BRR(11) = SMOOTH (17,J,K)
      IF (BRR(3).NE.0.) GO TO 30
      BRR(4) = SMOOTH(18,J,K)
      BRR(5) = 100.0
      IF(BRR(2).NE.0.) BRR(5)=100.*BRR(4)/ABS(BRR(2))
      GO TO 40
   30 BRR(5) = (SMOOTH (18,J,K)-1.)*100.
      BRR(4) = BRR(5)*BRR(2)/100.
   40 BRR(6) = SMOOTH (19,J,K)
      BRR(14) = SMOOTH (13,J,K)
      BRR(15) = SMOOTH (20,J,K)
   50 WRITE(IMES,2070) BRR
```

```
      RETURN
 2000 FORMAT('0','ALT-KM SECONDS    SZA  TMP C  CYCLE BATTV')
 2010 FORMAT (1X,F6.0,F8.1,F7.2,F7.1,F7.3,F6.2)
 2050 FORMAT(//,1X,'FILTER POSITION',I3)
 2051 FORMAT('+',20X,' (DIVIDED BY S0)')
 2060 FORMAT (1X,' KM',3X,' CNT/RAT',4X,' SLOPE',3X,'SDCNT',3X,' SD %',
     X3X,'COREL',3X,' END  IO',2X,'DIOCNT',2X,' DIO %',3X,' ABSORP',
     X4X,'DABSP',3X,'START',3X,'  END',3X,'USD',3X,'PTS'/)
 2070 FORMAT(1X,F3.0,3X,F8.3,2X,F8.3,2X,F7.4,2X,F5.2,3X,F5.2,3X,F8.3,2X,
     X F6.4,3X,F5.2,3X,F7.3,3X,F6.3,3X,F5.2,3X,F5.2,1X,F5.0,1X,F5.0)
      END

*** END OF MEMBER ***     67 RECORDS PROCESSED    ************************************************************
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```
      SUBROUTINE PRTWRT(ITBL)
C
C REED, BATLUCK, AND COOKE
C
C PRTWRT DISPLAYS THE OZONE PROFILES AS TABLES,
C   1. FLIGHT PARAMETERS
C   2. OZONE VALUES FOR EACH FILTER AT EACH KM. ALTITUDE
C   3. COMPOSITE OZONE PROFILE -VS KM
C   4. OZONE CONTENT OF 12 STANDARD PRESSURE LEVELS
C   5. OZONE VALUES AT STANDARD PRESSURE LEVELS.
C
C NOTE THAT SMOOTH NOW CONTAINS THE 1XX. AND 2XX. RECORDS FROM OZDENS.
C
      LOGICAL RTRN
      DIMENSION T(11),TA(15),TB(17),TC(18),TD(8)
      COMMON/DATAIN/NLAYRS,SECSZA(60),SMOOTH(20,60,7)
      COMMON/DATOUT/NSAV,NDXTOP,NDXBAS,NLVLS,DM(10),DOBTM,DOBAM,DOBPM,
     X PMDL(2),ECTIE,ECCOL,COMP(20,70),TYP4(40),TYP5(10,34)
      EQUIVALENCE (T(1),TA(1),TB(1),TC(1),TD(1))
C
C
      RTRN = .FALSE.
      GO TO 10
C
      ENTRY DATWRT(ITBL)
      RTRN = .TRUE.
C (1) TABLE OF FLIGHT PARAMETERS:
C
   10 WRITE (ITBL,2010) NDXBAS,(DM(I),I=1,4),(DM(J),J=7,10)
 2010 FORMAT('1','ROCOZ FLIGHT NO.',F6.1,' FLOWN',F8.0,'(MMDDYY.)',F10.1
     X,'(HHMMSS.S)'/'  AT ',F7.3,' LAT,',F9.3,' LONG.  ,',4A4//)
      WRITE (ITBL,2011)
 2011 FORMAT('0','ALT-KM ER% Z-HHMMSS.S SZA-DEG SZA-SEC SLNT-ATM SCAT',
     X' CMP% AIR T-K ERR-K AIR P-MBAR INSTR TMP-C'/)
      T(1) = 100.
      DO 40 J = 1,4
        DO 30 I = 1,60,2
        IF (SMOOTH(1,I,J).LT.20.) GO TO 40
        IF (SMOOTH(2,I,J) .GE. T(1)) GO TO 30
        T(1) = SMOOTH(2,I,J)
        T(2) = SMOOTH(3,I+1,J)
        T(3) = SMOOTH(4,I+1,J)
        T(4) = SMOOTH(5,I+1,J)
        T(5) = SMOOTH(4,I,J)
        T(6) = SMOOTH(7,I,J)
        T(7) = 100. * SMOOTH(15,I,J)
        T(8) = SMOOTH(11,I+1,J)
        T(9) = 0.01 * SMOOTH(12,I+1,J) * T(8)
        T(10)= SMOOTH(13,I+1,J)
        T(11)= SMOOTH(20,I,J)
        WRITE (ITBL,2030) T
 2030 FORMAT (1X,F5.0,F5.2,F10.1,F8.2,F8.4,F9.5,F9.3,F8.2,F6.2,F11.6,
     X F12.1)
   30   CONTINUE
   40 CONTINUE
C
```

```
C (2) OZONE PROFILE AS DERIVED FROM EACH FILTER.                        00000500
C     (A) INTERMEDIATE VALUES USED IN THE OZONE COMPUTATIONS.           00000510
C     (B) OZONE VALUES WITH AIR TEMP AND PRESSURE.                      00000520
      DO 80 J = 1,7                                                     00000530
        IF (SMOOTH(1,1,J).LT.20.) GO TO 80                              00000540
        IFILTR = SMOOTH(1,1,J) - 100.                                   00000550
        IRATIO = 0                                                      00000560
        IF (IFILTR .LT. 10) GO TO 45                                    00000570
        IRATIO = 1                                                      00000580
        IFILTR = IFILTR / 10                                            00000590
   45   WRITE(ITBL,2040)                                                00000592
 2040   FORMAT('1')                                                     00000594
        WRITE (ITBL,2045) IFILTR                                        00000600
 2045 FORMAT ('0','DATA FOR FILTER POSITION S',I1)                      00000610
        IF (IRATIO .EQ. 1) WRITE (ITBL,2046)                            00000620
 2046 FORMAT ('+',27X,' DIVIDED BY S0')                                 00000630
        WRITE (ITBL,2047)                                               00000640
 2047 FORMAT('0',' ALT INTENSITY  DLI/DH  NOISE   SLNTO  SLNTA ALPHA-F',00000650
     X' BET-F DA/DSLO  DSLA/DH O3TAU AIRTAU COMP SCAT%  B(SMTH)  BSTDV '00000660
     X,'  BDH'/)                                                        00000662
 2048 FORMAT (1X,F3.0,F10.4,2X,F7.4,F7.4,2X,F6.5,1X,F6.5,F8.3,F6.3,1X,  00000670
```

```
     X F8.4,F7.4,F7.3,F6.3,F6.0,F6.3,F9.4,F7.4,F6.2)
        N = 0
        DO 50 I = 1,59,2
          TB(1) = SMOOTH( 2,I,J)
          TB(2) = SMOOTH( 5,I,J)
          TB(3) = SMOOTH(10,I,J)
          TB(4) = SMOOTH(16,I,J)
          TB(5) = SMOOTH( 6,I,J)
          TB(6) = SMOOTH( 7,I,J)
          TB(7) = SMOOTH( 8,I,J)
          TB(8) = SMOOTH( 9,I,J)
          TB(9) = SMOOTH(11,I,J)
          TB(10)= SMOOTH(12,I,J)
          TB(11)= SMOOTH(13,I,J)
          TB(12)= SMOOTH(14,I,J)
          TB(13)= SMOOTH( 3,I,J)
          TB(14)= SMOOTH(15,I,J) * 100.
          TB(15)= SMOOTH(18,I,J)
          TB(16)= SMOOTH(19,I,J)
          TB(17)= SMOOTH(17,I,J)
          WRITE (ITBL,2048) TB
          N = N+2
          IF (SMOOTH(20,I+1,J).LE.0.) GO TO 52
   50     CONTINUE
C  PREPARE THE TABLES OF OZONE AND AIR PARAMETERS
   52       DO 60 K = 2,N,2
            TA(1) = SMOOTH( 2,K,J)
            TA(2) = SMOOTH( 4,K,J)
            TA(3) = SMOOTH( 7,K,J)
            TA(4) = SMOOTH( 8,K,J)
            TA(5) = SMOOTH( 6,K,J)
            TA(6) = SMOOTH( 9,K,J)
            TA(7) = SMOOTH(10,K,J)
            TA(8) = SMOOTH(11,K,J)
            TA(9) = SMOOTH(12,K,J)
            TA(10)= SMOOTH(13,K,J)
            TA(11)= SMOOTH(14,K,J)
            TA(12)= SMOOTH(15,K,J)
            TA(13)= SMOOTH(16,K,J)
            TA(14)= SMOOTH(17,K,J)
            TA(15)= SMOOTH(18,K,J)
            IF (K.NE.2) GO TO 55
            WRITE (ITBL,2045) IFILTR
            IF (IRATIO .EQ. 1) WRITE (ITBL,2046)
            WRITE (ITBL,2049)
 2049 FORMAT ('0',' ALT HHMMSS.S O3ATM-CM/KM   NUM/M3   ERR% COL-ATM-',
     X 'CM    NUM/M2 AIR-T-K ER% AIR-P-MBAR ER%   AIR-N/M3 AIR-COL',
     X '-ATM O3-NANOBAR  PPMV'/)
 2050 FORMAT (1X,F4.0,F9.1,1X,F10.6,1X,E10.4,F5.1,1X,F10.6,1X,E10.4,1X,
     X F7.2,F4.1,1X,F10.5,F4.1,1X,E10.4,2X,F10.6,1X,F10.5,F6.2)
   55       WRITE (ITBL,2050) TA
   60   CONTINUE
   80 CONTINUE
      IF (RTRN) GO TO 150
      GO TO 90
C
      ENTRY CMPWRT(ITBL)
```

```
      RTRN = .TRUE.                                                     00001219
C                                                                       00001220
C (3) COMPOSITE PROFILE - AT INTEGER ALT. LEVELS                         00001230
   90 WRITE (ITBL,2010) DM(5),(DM(I),I=1,4),(DM(J),J=7,10)              00001240
      WRITE (ITBL,2090)                                                 00001250
 2090 FORMAT ('0',' OZONE PROFILE BASED ON ALL AVAILABLE  ROCOZ DATA'/  00001260
     X ' ALT  ATM-CM/KM  O3 NUM/M3 ERRx COL ATM-CM ERRx AIR T K ERRx ', 00001270
     X 'AIR P MBAR ERRx  O3 NANOBAR ERRx   PPMV ERRx HHMMSS.S SECNDS',  00001280
     X ' FL   SZA'/)                                                    00001290
      DO 100 I = NDXTOP,NDXBAS                                          00001300
      CALL CMOVE (COMP(2,I),TC(1),72)                                   00001310
      WRITE (ITBL,2100) TC                                              00001320
 2100 FORMAT (1X,F3.0,E11.4,E11.4,F5.1,F11.6,F5.1,F8.1,F5.1,F11.4,      00001330
     X F5.1,F12.3,F5.1,F7.2,F5.1,F9.1,F7.0,F3.0,F6.2)                   00001340
  100 CONTINUE                                                          00001350
      IF (RTRN) GO TO 150                                               00001352
      GO TO 105                                                         00001354
C                                                                       00001356
      ENTRY TP4WRT(ITBL)                                                00001358
      RTRN = .TRUE.                                                     00001359
C                                                                       00001360
```

```
C (4) OZONE VALUES QF 12 STANDARD PRESSURE LEVELS.
C
  105 CONTINUE
C     WRITE (ITBL,2010) DM(5),(DM(I),I=1,4),(DM(J),J=7,10)
      WRITE (ITBL,2110)
 2110 FORMAT (//'0 LAYER BOUNDARIES   OZONE CONTENT')
      WRITE (ITBL,2113)
      TYP4(21) = TYP4(23)
      DO 120 I = 3,27,2
        IF (I.EQ.21) GO TO 120
        WRITE (ITBL,2112) TYP4(I),TYP4(I+2),TYP4(I+1)
 2112 FORMAT (1X,F7.3,'--',F8.3,6X,F8.3)
  120   CONTINUE
 2113 FORMAT (6X,'MILLIATM',8X,'MILLIATM-CM')
      IF (RTRN) GO TO 150
      GO TO 130
C
      ENTRY TP5WRT(ITBL)
C
C (5) OZONE VALUES AT STANDARD PRESSURE LEVELS
C
  130 WRITE (ITBL,2010) DM(5),(DM(I),I=1,4),(DM(J),J=7,10)
      WRITE (ITBL,2130)
 2130 FORMAT ('0OZONE FROM THE COMPOSITE PROFILE AND ECC PROFILE AT',
     X ' STANDARD PRESSURE LEVELS'/'0PRESSURE ALTITUDE AIR TEMP   ',
     X 'ROCOZ O3   ROCOZ O3 ECC AIR   ECC O3 ECC O3'/'     MBAR      ',
     X 'KM        K       NUM/M3   MRMASS   TEMP K    NUM/M3 MRMASS'/)
      DO 140 I = 1,33
        IF (TYP5(1,I) .LT. 499.) GO TO 150
        CALL CMOVE (TYP5(3,I),TD(1),32)
        WRITE (ITBL,2131) TD
 2131 FORMAT (1X,F8.2,F9.3,F8.1,E12.3,F9.3,F8.1,E11.3,F7.3)
  140   CONTINUE
C COMPLETED DISPLAYS
  150 RETURN
      END
```

*** END OF MEMBER ***   191 RECORDS PROCESSED   **

```
      SUBROUTINE RELATD(IMES)
C CONVERT TO MILLI ATM-CM.
C REED, BATLUCK, AND COOKE
C
C RELATED COMPLETES THE PREPARATION OF COMPOSITE DATA RECORDS, LOCATED
C IN COMP (COMMON/DATOUT/) AND NEW RECORDS OF TYPES 400 AND 500 TO
C EXPRESS THE DATA IN UNITS MORE CONVENIENT FOR SOME USERS, NAMELY,
C OZONE CONTENT IN TWELVE STANDARD PRESSURE LAYERS, AND OZONE VALUES AT
C 33 STANDARD PRESSURE LEVELS, USING ROCOZ DATA, SUPPLEMENTED BY ECC
C DATA AT THE LOWER LEVELS.
C
C THE CONTENTS OF COMMON/DATOUT/ ARE RENAMED TO CORRESPOND TO THEIR
C USAGE IN THIS SUBROUTINE.
C
      DIMENSION PLS(33)
      COMMON/PROFLS/DSB(3),MXSND,NECC(2),ECCLM(3,2),SONDE(5,70),
     X              ECC(4,19,2),STD(3,60)
      COMMON/DATAIN/NLAYRS,SECSZA(60),SMOOTH(20,60,7)
      COMMON/DATOUT/NSAV,NDXTOP,NDXBAS,NLVLS,DM(10),DOB(3),PMDL(2),
     X              ECTIE,ECCOL,COMP(20,70),TYP4(40),TYP5(10,34)
      COMMON/CONSTT/AVOGAD,VOLSTP,RSTAR,DGTORD,GRV45,AIRM,GRV,RZRO
      DATA PLS/0.05,0.07,0.10,0.15,0.20,0.30,0.40,0.50,0.70,1.,1.5,2.,
     X 3.,4.,5.,7.,10.,15.,20.,30.,40.,50.,70.,100.,150.,200.,250.,300.,
     X 400.,500.,700.,850.,1000./
C
C INITIALIZE TYP4 AND TYP5 TO 0.0
C PLACE LAYER BOUNDARIES (MILLIATMOSPHERES) IN TYP4
      TYP4(1) = 0.0
      CALL CMOVE (TYP4(1),TYP4(2),1516)
      TYP4(1) = 400.
      TYP4(2) = 1.
      TYP4(5) = 250./1024.
      DO 54 I = 7,25,2
   54   TYP4(I) = TYP4(I-2) * 2.
C FIND ROCOZ OVERBURDEN AT UPPER BOUNDARY OF EACH LAYER
C    TO CONVERT MBAR TO MATM, DIVIDE MBAR BY 1.01325
      RPATM = COMP(10,NDXTOP) / 1.01325
      DO 58 I = 5,19,2
        L = I
        IF (TYP4(L) .GE. RPATM) GO TO 60
   58   CONTINUE
C
   60 TPMB = TYP4(L) * 1.01325
      DO 64 I = NDXTOP,NDXBAS
        N = I
        IF (TPMB - COMP(10,N+1)) 68,66,64
   64   CONTINUE
      GO TO 70
   66 TYP4(L+1) = COMP(10,N)
      GO TO 69
C
   68 IF (N .EQ. NDXBAS) GO TO 70
      TYP4(L+1) =COMP(6,N+1)+(TPMB-COMP(10,N+1))*(COMP(6,N)-COMP(6,N+1))
     X  /(COMP(10,N)-COMP(10,N+1))
   69 L = L + 2
      GO TO 60
```

```
C COMPUTE LAYER CONTENTS
   70 DO 74 I = 4,24,2
        IF (TYP4(I).EQ.0. .OR. TYP4(I+2).EQ.0.) GO TO 74
        TYP4(I) = (TYP4(I+2) - TYP4(I)) * 1000.
        N = I
   74   CONTINUE
      TYP4(N+2) = 0.0
C ADD DATA FROM ECC SONDE, ESTIMATE OZONE CONTENT IN STD PRESS LAYERS
      TYP4(24) = (ECCLM(3,1) - ECCLM(2,1)) * 1013.25
      TYP4(26) = (ECCLM(2,1) - ECCLM(1,1)) * 1013.25
      TYP4(28) = (ECCLM(1,1)) * 1013.25
C MOVE DATA AND CREATE 2ND RECORD
      TYP4(29) = 1000.
      TYP4(27) = 250.
      TYP4(25) = 125.
      TYP4(23) =  62.5
      IF (TYP4(22).NE.0.) TYP4(24) = TYP4(22)
      TYP4(22) = 2.
      TYP4(21) = 400.
C *** TEST STATEMENT
C     CALL TP4WRT(IMES)
```

```
C
C CREATE   RECORDS GIVING DATA AT  STANDARD PRESSURE LEVELS.
      N  = 0
      NC = NDXTOP
      CON = 1.E-3 * AVOGAD/RSTAR
      DO 100 IP = 1,33
      N = N+1
      TYP5(1,N) = 500.
      TYP5(2,N) = N
      TYP5(3,N) = PLS(IP)
      IF (PLS(IP).LT.COMP(10,NC)) GO TO 100
   86 IF ((NC+1).GT.NDXBAS) GO TO 91
      IF (PLS(IP) .LT. COMP(10,NC+1)) GO TO 90
      NC = NC + 1
      GO TO 86
   90 FRAC = ALOG(PLS(IP)/COMP(10,NC))/ALOG(COMP(10,NC+1)/COMP(10,NC))
      TYP5(4,N) = COMP(2,NC) + FRAC * (COMP(2,NC+1)-COMP(2,NC))
      TYP5(5,N) = COMP(8,NC) + FRAC*(COMP(8,NC+1)-COMP(8,NC))
      FRACT = (PLS(IP)-COMP(10,NC))/(COMP(10,NC+1)-COMP(10,NC))
      TYP5(6,N) = COMP(4,NC) + FRACT*(COMP(4,NC+1)-COMP(4,NC))
      TYP5(7,N) = 1.65714 * (COMP(14,NC)+FRAC*(COMP(14,NC+1)-COMP(14,NC)
     X))
C  FIND ECC DATA FOR THIS RECORD
   91 IF (IP.LT.17) GO TO 100
      NE = 36 - IP
      IF (NE.LE.16) NE = NE - 1
      IF (NE.LE.12) NE = NE - 1
      IF (ECC(4,NE,1).EQ.0.) GO TO 100
      TYP5(8,N) = ECC(2,NE,1)
      TYP5(9,N) = (CON * ECC(4,NE,1)) / ECC(2,NE,1)
      TYP5(10,N)= 1.65714 * ECC(4,NE,1)/ECC(3,NE,1)
      IF (TYP5(4,N).EQ.0.0) TYP5(4,N) = ECC(1,NE,1)
  100 CONTINUE
C
C *** TEST STATEMENT
C     CALL TP5HRT(IMES)
C ALL TYP5 RECORDS COMPLETE
      RETURN
      END
```

*** END OF MEMBER ***   116 RECORDS PROCESSED   **

```
      SUBROUTINE SECANG(IMES)
C
C REED, BATLUCK, AND COOKE     MAR  83
C
C SECANG COMPUTES THE SECANT OR THE CHAPMAN FUNCTION FOR THE SOLAR
C ZENITH ANGLE.
C REF: CHAPMAN,S.,PROC. PHYS. SOC. (LONDON),43,483-501,1931
C      CHAPMAN,S.,PROC. PHYS. SOC. (LONDON)B,66,710-712,1953
C      MCCARTNEY,E.V., OPTICS OF THE ATMOSPHERE,J.WILEY,1967,PP 109-13.
C      FITZMAURICE,J.A.,APPL. OPT.,3,640,1964.
C      SERIES EXPANSION IS FROM K.KLENK, SYS. & APPL. SCI. CORP.
C SCALE HEIGHT IS FOR OZONE ABOVE 40 KM.
C
      DIMENSION A(5)
      COMMON/CONSTT/AVOGAD,VOLSTP,RSTAR,DGTORD,GRV45,AIRM,GRV,RZRO
      COMMON/DATAIN/NLAYRS,SECSZA(60),SMOOTH(20,60,7)
      DATA P/0.327591/, A/1.061405,-1.453152,1.421413,-0.284496,0.254829
     X/,SH /5.0/,PI/3.141593/
C
      DO 100 I = 1,NLAYRS
      ANG = SMOOTH(5,I,1)
      IF (ANG .GT. 86.) GO TO 80
      CZ = COS(ANG*DGTORD)
      IF (CZ .LT. 0.5) GO TO 20
      SECSZA(I) = 1./CZ
C *** TEST STATEMENTS
C     WRITE (IMES,2000) I,ANG,SECSZA(I)
C2000 FORMAT (1X,I2,3X,' ANGLE: ',F7.3,5X,' SECSZA: ',F7.3)
      GO TO 100
C AT SOLAR ZENITH ANGLES GREATER THAN 60 DEG., USE CHAPMAN FUNCTION
C ARBITRARILY USE SCALE HEIGHT = 5; SUITABLE FOR OZONE ABOVE ABOUT 40 KM
C
   20 R = (RZRO + SMOOTH(2,I,1))/SH
      X = CZ * SQRT(R*0.5)
      IF (CZ .GE. 0.2) GO TO 40
C FOR SZA GREATER THAN 78.45 DEGREES
      T = 1./(1.+P*X)
      SUM = 0
      DO 22 J=1,5
   22 SUM = T * (A(J)+SUM)
      SECSZA(I) = SUM * SQRT(R*0.5*PI)
C *** TEST STATEMENTS
C     WRITE (IMES,2000) I,ANG,SECSZA(I)
      GO TO 100
C
C FOR ANGLES BETWEEN 60 AND 78 DEGREES
   40 T = 0.5/(X*X)
      SECSZA(I) = (1.-T*(1.-3.*T*(1.-5.*T)))/CZ
C *** TEST STATEMENTS
C     WRITE (IMES,2000) I,ANG,SECSZA(I)
      GO TC 100
C
   80 WRITE (IMES,2080) SMOOTH(2,I,1), ANG
 2080 FORMAT ('0SECANG 2080: SOLAR ZENITH ANGLE AT',F4.0,' KM IS',F6.1,
     X' SEC SZA IS ARBITRARILY SET TO 15.')
      SECSZA(I) = 15.
```

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```
C
  100 CONTINUE
C
      DO 150 I=1,NLAYRS
  150 IF (SECSZA(I) .GT. 2.7) GO TO 160
      GO TO 900
C SCALE HEIGHT FOR AIR IS 6-10 KM AND SHOULD BE COMPUTED FROM
C DATASONDE PROFILE
  160 WRITE (IMES,2160)
 2160 FORMAT (' SECANG 2160: WARNING: FOR SZA GT 69 DEGREES, THE SECANT'
     X,' FOR AIR MAY BE MORE THAN 1 x SMALLER THAN FOR OZONE')
C
C
  900 RETURN
      END
```

*** END OF MEMBER ***   71 RECORDS PROCESSED   **

```
      SUBROUTINE SHAPE(NF,FILTER,LMA,LMB,IMES,NCODE)
C
C REED, BATLUCK, COOKE             JUNE 1983
C
C SHAPE SELECTS THE DATA FILE FOR THE REQUESTED FILTER AND RETURNS THE
C        MEASURED TRANSMISSION.
C
C ARGUMENTS
C  NF      THE FILTER NUMBER 1-4 CORRESPONDS TO S3,S2,S1,S0.
C  FILTER  ARRAY CONTAINING MEASURED FILTER TRANSMISSIONS.
C  IMES    UNIT NUMBER FOR MESSAGES.
C  LMA     INDEX OF SHORT WAVELENGTH
C          START OF FILTER TRANSMISSION
C  LMB     INDEX OF LONG WAVELENGTH
C          END
C  NCODE   IF NO DATA ARE AVAILABLE. FILTER CONTAINS 0.0.
C
      DIMENSION FILTER(1000)
      FILTER(1) = 0.
      CALL CMOVE (FILTER(1),FILTER(2),3996)
C NO MEASURED DATA AVAILABLE.
  900 WRITE (IMES,2900) NF
 2900 FORMAT('0SHAPE 2900: NO TRANSMISSION DATA AVAILABLE FOR FILTER',
     X I3)
      NCODE = -15
      RETURN
      END
```

*** END OF MEMBER ***   27 RECORDS PROCESSED   ***

```
      SUBROUTINE SLANTA(LT,LC,LB,ALTT,ALTC,ALTB,ASLTT,ASLTC,ASLTB,DMDHC,
     X ISNDC,NCODE,IMES)
C
C REED, BATLUCK, COOKE        APRIL 1983
C
C SLANTA OBTAINS THE SLANT AIR MASS IN ATMOSPHERES FOR THE THREE LAYERS
C   UNDER CONSIDERATION. THE NUMBER OF ATMOSPHERES IN A COLUMN ABOVE A
C   GIVEN LEVEL IS THE PRESSURE AT THAT LEVEL DIVIDED BY STANDARD
C   ATMOSPHERIC PRESSURE, ADJUSTED FOR CHANGE IN GRAVITY. FROM
C   U.S. STD. 1976, P0 = 1013.25 MBAR AND CORRESPONDING G = 9.80665
C   M/S**2.
C
C ARGUMENTS
C   LT,LC,LB = INDEX OF LEVELS UNDER CONSIDERATION - SECSZA ARRAY
C   ALTT, ALTC, ALTB = ALTITUDES UNDER CONSIDERATION
C   ASLTT, ASLTC, ASLTB = SLANT AIR MASS, IN ATMOSPHERES
C   DMDHC = RATE OF CHANGE OF SLANT AIR MASS AT ALTITUDE C, IN ATM/KM
C   ISNDC = INDEX IN SONDE FOR ALTC
C   NCODE = -20    PRESSURE DATA ARE NOT AVAILABLE AT DESIRED LEVELS.
C
      LOGICAL NOT
      COMMON/PROFLS/DSB(3),MXSND,NECC(2),ECCLM(3,2),SONDE(5,70),
     X ECC(4,19,2),STD(3,60)
      COMMON/DATAIN/NLAYRS,SECSZA(60),SMOOTH(20,60,7)
C
      COMMON/CONSTT/AVOGAD,VOLSTP,RSTAR,DGTORD,GRV45,AIRM,GRV,RZRO
C
      COLUMN(P1,P2,Z) = CON * EXP(ALOG(P1)-(ALOG(P1)-ALOG(P2)) * (Z1-Z)/
     * (Z1-Z2))
      NOT   (SLT,Z) = (SLT.NE.0. .OR. Z.GT.Z1 .OR. Z.LT.Z2)
      CON = 9.80665/(GRV*1013.25)
C TO CONVERT FROM KG/M3 PER M TO ATM PER KM
      CONM = 1000./10332.
      ISNDC = 0
      IF (SONDE(1,1) .LT. ALTT) GO TO 900
      ASLTT = 0.0
      ASLTC = 0.0
      ASLTB = 0.0
C FIND DESIRED LEVELS IN SONDE; COMPUTE SLANT AIR MASS.
      DO 100 I=1,MXSND
      ALT = SONDE(1,I)
      PRS = SONDE(3,I)
      IF (ALT .GT. ALTT) GO TO 100
      IF (ALT. EQ. ALTT) ASLTT = SECSZA(LT) *  PRS * CON
      IF (ALT .NE. ALTC) GO TO 80
      ASLTC = SECSZA(LC) * PRS * CON
      DMDHC = SECSZA(LC) * SONDE(4,I) * CONM
      ISNDC = I
      GO TO 100
   80 IF (ALT .EQ. ALTB) ASLTB = SECSZA(LB) * PRS * CON
      IF (ALT .LT. ALTB) GO TO 110
  100 CONTINUE
C
  110 IF (ASLTB .NE. 0.0) GO TO 999
C
C
```

```
C INTERPOLATE AT DESIRED ALTITUDES AND COMPUTE SLANT AIR MASS.
C
      N = NECC(1)
      DO 200 J=1,N
      I = NECC(1) - J + 1
      Z1 = ECC(1,I,1)
      Z2 = ECC(1,I-1,1)
C
      IF (NOT(ASLTT,ALTT)) GO TO 120
      ASLTT = SECSZA(LT) * COLUMN(ECC(3,I,1),ECC(3,I+1,1),ALTT)
  120 IF (NOT(ASLTC,ALTC)) GO TO 140
      ASLTC = SECSZA(LC) * COLUMN(ECC(3,I,1),ECC(3,I+1,1),ALTC)
      TEMP = ECC(2,I,1) - (ECC(2,I,1)-ECC(2,I+1,1)) *
     X  (ECC(1,I,1)-ALTC) / (ECC(1,I,1)-ECC(1,I+1,1))
      DMDHC = AIRM * ASLTC * GRV * 103.41 / (RSTAR*TEMP)
  140 IF (NOT(ASLTB,ALTB)) GO TO 200
      ASLTB = SECSZA(LB) * COLUMN(ECC(3,I,1),ECC(3,I+1,1),ALTB)
C
      GO TO 999
C
  200 CONTINUE
```

```
C
      GO TO 910
C
C
C ODDS AND ENDS
C
C SONDE PROFILE DOES NOT EXTEND TO HIGH ENOUGH ALTITUDE.
  900 WRITE (IMES,2900) ALTT, SONDE(1,1)
 2900 FORMAT ('0SLANTA 2900: DESIRED TOP ALTITUDE =',F6.0,' TOP SONDE',
     X' ALTITUDE IS',F6.0)
      GO TC 990
C DESIRED ALTITUDES NOT FOUND IN ECC PROFILE
  910 WRITE (IMES,2910)
 2910 FORMAT ('0SLANT 2910: DESIRED ALTITUDES NOT FOUND IN ECC-1')
C
  990 NCODE = -20
  999 RETURN
      END
```

*** END OF MEMBER ***   95 RECORDS PROCESSED   **

```
      SUBROUTINE TAPE(NCODE,IMES)
C
C REED, BATLUCK, AND COOKE,   FEB 1983
C
C TAPE READS THE SMOOTHED OZONE DATA TAPE (COUNTS VS ALTITUDE) AND
C      PLACES THE PEDIGREE RECORDS IN PED, THE DATA IN SMOOTH.
C
C   NCODE = 1  NO PROBLEMS
C         = -6 EOF DURING PEDIGREE RECORDS
C         = -7 READ ERROR ON SMOOTH TAPE.
C         = -8 WRONG FLIGHT NUMBER IN PEDIGREE RECORDS.
C   NLAYRS= NUMBER OF ALTITUDE LEVELS IN ROCOZ SMOOTH ARRAY.
C
C
      REAL*8 TAPEIN,TAPOUT
      DIMENSION R(20)
      COMMON/SETUP/TAPEIN,TAPOUT,NFIN,NFOT,INCLD(7),TOP(7),BASE(7)
      COMMON/DATAIN/NLAYRS,SECSZA(60),SMOOTH(20,60,7)
      COMMON/DATOUT/NSAV,PED(20,30),SAVE(20,60)
      DATA IUNIT/10/
C
C MOUNT AND POSITION TAPE.
      CALL MOUNT(1,IUNIT,TAPEIN,NFIN)
C READ PEDIGREE RECORDS; CHECK FLIGHT NUMBERS.
      NREC = 0
      FLTN = PED(2,5)
      DO 20 I=1,4
      CALL FREAD (PED(1,I),IUNIT,LEN,&910,&920)
C **** TEST STATEMENT
C     WRITE(IMES,2900) (PED(J,I),J=1,9)
 2900 FORMAT (1X,F5.0,2X,F5.1,2X,F7.0,2X,F9.2,2X,F9.2,2X,F8.3,2X,
     X F9.3,2X,F9.2,2X,F9.2)
      NREC = NREC + 1
      IF (PED(2,I) .NE. FLTN ) GO TO 930
   20 CONTINUE
C READ SMOOTH DATA
      PASTF = 99.
   30 NREC = NREC + 1
      CALL FREAD(R(1),IUNIT,LEN,&940,&920)
      IF (R(1) .EQ. PASTF) GO TO 35
      WRD1 = R(1)
      J = 0
      IF (WRD1 .EQ. 3.) J=1
      IF (WRD1 .EQ. 2.) J=2
      IF (WRD1 .EQ. 1.) J=3
      IF (WRD1 .EQ. 0.) J=4
      IF (WRD1 .EQ. 30.) J=5
      IF (WRD1 .EQ. 20.) J=6
      IF (WRD1 .EQ. 10.) J=7
      PASTF = WRD1
      IF (J.EQ.0) GO TO 935
      NLAYRS = 0
   35 NLAYRS = NLAYRS + 1
      CALL CMOVE (R(1),SMOOTH(1,NLAYRS,J),80)
C *** TEST STATEMENT
C     WRITE(IMES,2905) NREC,SMOOTH(1,NLAYRS,J),SMOOTH(2,NLAYRS,J),
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```
C     X NLAYRS,J
 2905 FORMAT(1X,I4,2F10.3,2X,I2,2X,I2)
      GO TO 30
C
C ODDS AND ENDS
C
C END OF FILE DURING FIRST FOUR RECORDS
  910 WRITE (IMES,2910) IUNIT, NREC
 2910 FORMAT ('0TAPE 2910: UNEXPECTED EOF ON UNIT',I4,' AFTER RECORD',
     XI3)
      NCODE = -6
      GO TO 999
C ERROR IN READING SMOOTH TAPE.
  920 WRITE (IMES,2920) IUNIT,NREC
 2920 FORMAT ('0TAPE 2920: READ ERROR, UNIT',I4,' AFTER RECORD',I5)
      NCODE = -7
      GO TO 999
C FLIGHT NUMBERS DO NOT MATCH
  930 WRITE (IMES,2930) FLTN,NREC,PED(1,NREC),PED(2,NREC)
 2930 FORMAT ('0TAPE 2930: DESIRED FLIGHT NO.',F6.1,'.RECORD NO',I3,
     X' WORDS 1 AND 2 ARE',F6.0,F7.1)
```

```
      NCODE = -8                                                        00000660
      GO TO 999                                                         00000670
C INVALID VALUE FOR WORD 1                                              00000672
  935 WRITE (IMES,2935) NREC,WRD1,WRD1,WRD1                             00000674
 2935 FORMAT ('0TAPE 2935:  RECORD NO',I6,',WORD 1 IS: ',G13.4,         00000676
     X2X,I10,2X,A4)                                                     00000678
      NCODE = -1                                                        00000680
      GO TO 999                                                         00000682
C NORMAL EOF                                                            00000740
  940 NREC=NREC-1                                                       00000750
      WRITE (IMES,2940) NREC                                            00000760
 2940 FORMAT('0TAPE 2940:',I5,' RECORDS FROM SMOOTH TAPE')              00000770
      NCODE = 1                                                         00000780
  999 RETURN                                                            00000790
      END                                                               00000800
```

*** END OF MEMBER ***   92 RECORDS PROCESSED   ***

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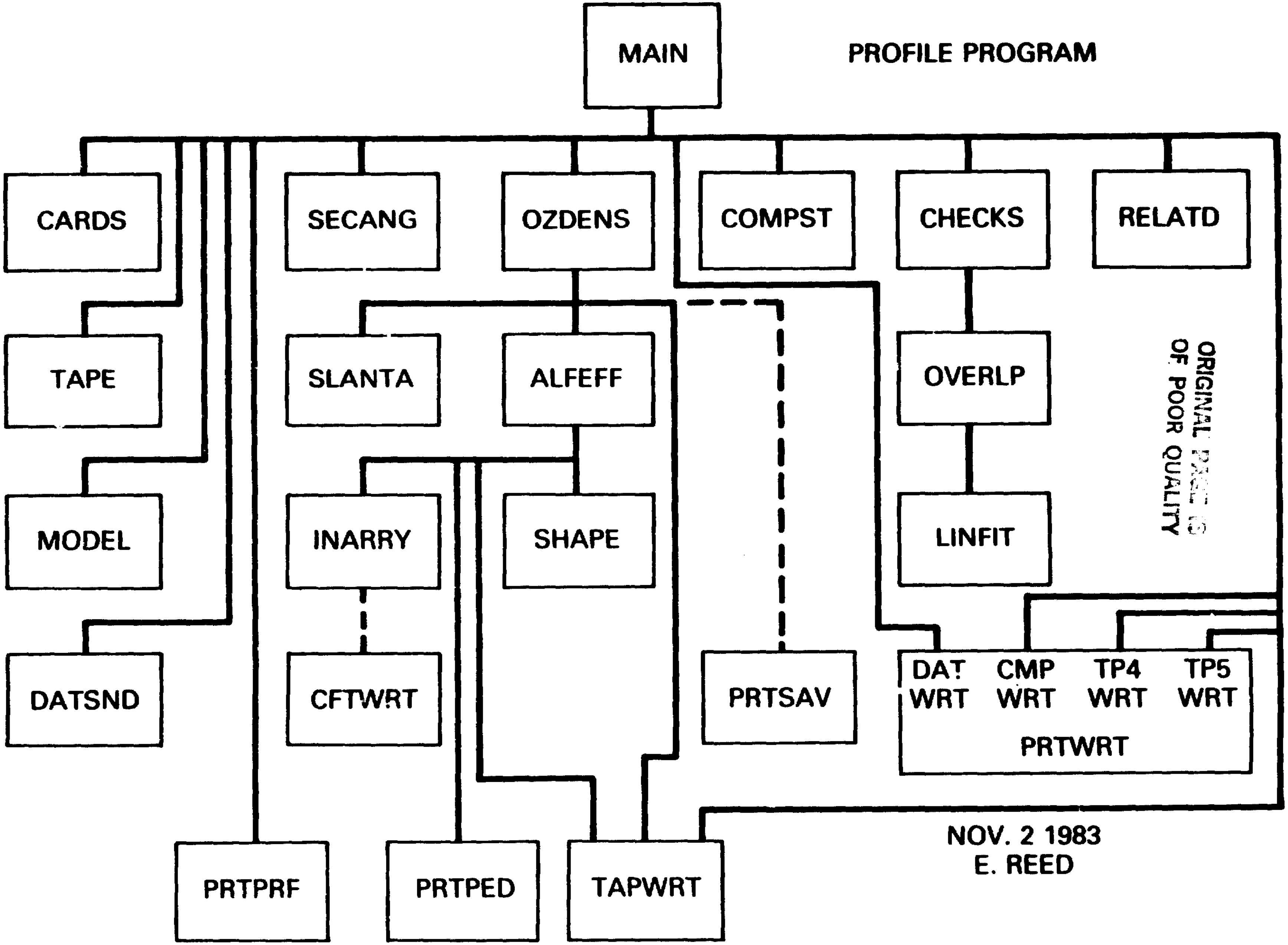
```
      SUBROUTINE TAPWRT(MODE,IMES)
C
C REED, BATLUCK, COOKE                                MAR 1983
C
C TAPWRITE PERFORMS ALL TAPE OUT OPERATIONS, USING FTIO
C
C   MODE  = 1 MOUNT TAPE AND WRITE PED RECORDS
C         = 2 WRITE OZONE PROFILES
C         = 3 WRITE DERIVED PROFILES AND CLOSE OUTPUT TAPE
C
C
C
      REAL*8 TAPEIN,TAPOUT
      DIMENSION COMP(20,70),TYP4(20,2),TYP5(20,17)
C
      COMMON/SETUP/TAPEIN,TAPOUT,NFIN,NFOT,DUM(4,3)
C
      COMMON/DATOUT/NSAV,PED(20,30),SAVE(20,60)
      EQUIVALENCE (NDXTOP,PED(1,1)), (NDXBAS,PED(2,1)),
     X(COMP(1,1),PED(1,2)),(TYP4(1,1),SAVE(1,42)),(TYP5(1,1),SAVE(1,44))
C
      DATA NREC/0/,IOUT/15/,LEN/80/
C
C
      IF (MODE - 2) 100,300,500
C WRITE PEDIGREE RECORDS
C
  100 CALL MOUNT(2,IOUT,TAPOUT,NFOT)
C
      DO 120 I = 1,NSAV
      CALL FWRITE(PED(1,I),IOUT,LEN)
      T = PED(1,I)
  120 NREC = NREC + 1
  130 GO TO 600
C
C WRITE THE OZONE DATA RECORDS
  300 IF (NSAV .LE. 60) GO TO 310
      WRITE (IMES,2300) NSAV
 2300 FORMAT ('0TAPWRT 2300: NSAV WAS',I8,'; RESET TO 60')
      NSAV = 60
  310 DO 320 I = 1,NSAV
      CALL FWRITE(SAVE(1,I),IOUT,LEN)
  320 NREC = NREC + 1
      T = SAVE(1,NSAV)
      GO TO 600
 2320 FORMAT ('0TAPWRT 2320: ',A8,' FILE',I3,' ON UNIT',I3,' HAS',I4,
     X' RECORDS. LAST RECORD IS TYPE',F6.0)
  330 GO TO 990
C WRITE COMPOSITE PROFILE, PROFILE IN STD LAYERS, AND AT STD PRESSURES.
  500 DO 510 I = NDXTOP,NDXBAS
        CALL FWRITE(COMP(1,I),IOUT,LEN)
  510   NREC = NREC + 1
      CALL FWRITE(TYP4(1,1),IOUT,LEN)
      CALL FWRITE(TYP4(1,2),IOUT,LEN)
      NREC = NREC + 2
      DO 520 I = 1,17
```

```
      CALL FWRITE(TYP5(1,I),IOUT,LEN)                             00000530
  520   NREC = NREC + 1                                           00000540
        T = TYP5(1,17)                                            00000542
  600 WRITE (IMES.2320) TAPOUT,NFOT,IOUT,NREC,T                   00000550
C END                                                             00000700
  990 RETURN                                                      00000710
      END                                                         00000720

*** END OF MEMBER ***     63 RECORDS PROCESSED   *********************************************************************
```


PROFILE PROGRAM
MAIN
CARDS
TAPE
MODEL
DATSND
SECANG
SLANTA
INARRY
CFTWRT
OZDENS
ALFEFF
SHAPE
COMPST
PRTSAV
CHECKS
OVERLP
LINFIT
RELATD
DAT WRT
CMP WRT
TP4 WRT
TP5 WRT
PRTWRT
PRTPRF
PRTPED
TAPWRT
NOV. 2 1983
E. REED

	ALFEFF	CARDS	CFTWRT	CHECKS	COMPST	DATSND	INARRY	LINFIT	MODEL	OVERLP	OZDENS	PRTPED	PRTPRF	PRTSAV	PRTWRT	DATWRT	CMPWRT	TP4WRT
MAIN		X		X	X	X			X		X		X			X	X	X
ALFEFF							X					X						
CARDS																		
CFTWRT																		
CHECKS										X								
COMPST																		
DATSND																		
INARRY			T															
LINFIT																		
MODEL																		
OVERLP								X										
OZDENS	X													T				
PRTPED																		
PRTPRF																		
PRTSAV																		
PRTWRT																		
DATWRT																		
CMPWRT																		
TP4WRT																		
TP5WRT																		
RELATD																		
SECANG																		
SHAPE																		
SLANTA																		
TAPE																		
TAPWRT																		

	TP5WRT	RELATD	SECANG	SHAPE	SLANTA	TAPE	TAPWRT	CMOVE	FT10	RPDAT0	/COEFTS	/SETUP	/PROFLS	/FSHAPE	/CONSTT	/DATAIN	/DATOUT
MAIN	X	X	X			X	X	X				X	X	X	X	X	X
ALFEFF				X			X			X	X		X	X			
CARDS												X	X	X			X
CFTWRT											X						
CHECKS												X	X		X	X	X
COMPST								X							X	X	X
DATSND															X		
INARRY								X			X		X				X
LINFIT																	
MODEL													X		X		X
OVERLP																	X
OZDENS					X		X	X				X	X		X	X	X
PRTPED																	X
PRTPRF													X				
PRTSAV																	X
PRTWRT								X								X	X
DATWRT																	
CMPWRT																	
TP4WRT																	
TP5WRT																	
RELATD								X					X		X	X	X
SECANG															X	X	
SHAPE								X									
SLANTA													X		X	X	
TAPE									X			X				X	X
TAPWRT									X			X					X

OUTPUT LISTINGS

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******************************************************************************
PROGRAM TO SAMPLE RAW OZONE TAPE (REVISED OCT.1982)
******************************************************************************
FLIGHT NUMBER   325   TAPE KA2130  FILE   2          PRINT VERSION    1
PRINT  40 SAMPLES, RECORDS    1 TO    3 EVERY    50 RECORDS
******************************************************************************

RECORD     0 HAS    46 WORDS. TAPE     1  PCM4  S.L.O.O. T1-776

RECORD WORDS DT/FR FR/BF SCALE MR/FR MD/FR PRE 8 BFAPP INPUT OUTPT    17    18    19   RUN STREAM
    -3    20     8   110     0     3    11     2     6  1210  122'     0     0     0  PCM4   PCM4

  1  1220 WORDS, BLOCK    68 STREAM PCM4 PR/AP    10 DATA BF=  1210 STAT 00   START 326 D 15 HR 29 MN 30+ 0.090 SEC. MD1=0,F: 110
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DAY	HOUR	MIN	SEC	SEC.	ELAPSED SEC	S0	S1	COMP	S4	S5	BATT	MARKER	UNCOMP
326	15	29	30	0.0900	1770.0898	1023	1023	0	1023	1023	650	474	1
326	15	29	30	0.1000	1770.0999	1023	1023	0	1023	1023	650	474	1
326	15	29	30	0.1100	1770.1099	1023	1023	0	1023	1023	650	474	0
326	15	29	30	0.1200	1770.1199	1023	1023	0	1023	1023	650	132	0
326	15	29	30	0.1300	1770.1299	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.1400	1770.1399	1023	1023	0	1023	1023	650	132	0
326	15	29	30	0.1500	1770.1499	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.1700	1770.1699	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.1800	1770.1799	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.1900	1770.1899	1023	1023	0	1023	1023	650	132	0
326	15	29	30	0.2000	1770.2000	1023	1023	0	1023	1023	650	132	0
326	15	29	30	0.2100	1770.2100	1023	1023	0	1023	1023	650	132	0
326	15	29	30	0.2200	1770.2200	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.2300	1770.2300	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.2400	1770.2400	1023	1023	0	1023	1023	650	132	2
326	15	29	30	0.2600	1770.2598	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.2700	1770.2698	1023	1023	0	1023	1023	650	131	0
326	15	29	30	0.2800	1770.2798	1023	1023	0	1023	1023	650	132	2
326	15	29	30	0.2900	1770.2898	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.3000	1770.2998	1023	1023	0	1023	1023	650	131	1
326	15	29	30	0.3100	1770.3098	1023	1023	0	1023	1023	650	131	1
326	15	29	30	0.3200	1770.3198	1023	1023	0	1023	1023	650	131	1
326	15	29	30	0.3300	1770.3298	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.3500	1770.3499	1023	1023	0	1023	1023	650	132	0
326	15	29	30	0.3600	1770.3599	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.3700	1770.3699	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.3800	1770.3799	1023	1023	0	1023	1023	650	132	2
326	15	29	30	0.3900	1770.3899	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.4000	1770.3999	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.4100	1770.4099	1023	1023	0	1023	1023	650	132	0
326	15	29	30	0.4200	1770.4199	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.4400	1770.4399	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.4500	1770.4500	1023	1023	0	1023	1023	650	132	2
326	15	29	30	0.4600	1770.4600	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.4700	1770.4700	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.4800	1770.4800	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.4900	1770.4900	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.5000	1770.5000	1023	1023	0	1023	1023	650	132	2
326	15	29	30	0.5100	1770.5098	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.5300	1770.5298	1023	1023	0	1023	1023	650	132	1
326	15	29	30	0.5400	1770.5398	1023	1023	0	1023	1023	650	132	1

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FLIGHT NO. 325   DATE LAUNCHED (MMDDYY.): 112283.   INPUT TAPE NO.: KA2131   FILE NO.: 1   RADAR

SEC ELAPSED	HEIGHT	LATITUDE	LONGITUDE
0.00	6149.45	37.8347	-75.4773
1.00	6149.45	37.8347	-75.4773
2.00	6149.45	37.8347	-75.4773
3.00	6149.45	37.8347	-75.4773
4.00	6149.45	37.8347	-75.4773
5.00	6149.45	37.8347	-75.4773
6.00	7786.07	37.8278	-75.4686
7.00	11118.77	37.8137	-75.4509
8.00	14271.34	37.8025	-75.4371
9.00	16274.91	37.8158	-75.4508
10.00	16569.59	37.8200	-75.4569
11.00	16768.87	37.8234	-75.4613
12.00	16931.79	37.8267	-75.4648
13.00	14461.36	37.8328	-75.4729
14.00	16493.94	37.8308	-75.4700
15.00	17582.97	37.8303	-75.4692
16.00	18646.62	37.8298	-75.4683
17.00	19695.71	37.8293	-75.4674
18.00	20732.18	37.8288	-75.4665
19.00	21751.30	37.8283	-75.4656
20.00	22759.49	37.8278	-75.4648
21.00	23756.54	37.8273	-75.4639
22.00	24743.88	37.8268	-75.4630
23.00	25714.74	37.8263	-75.4621
24.00	26681.57	37.8258	-75.4613
25.00	27633.31	37.8252	-75.4604
26.00	28576.78	37.8247	-75.4595
27.00	29505.94	37.8243	-75.4587
28.00	30425.92	37.8237	-75.4578
29.00	31331.52	37.8233	-75.4570
30.00	32229.27	37.8227	-75.4561
31.00	33121.43	37.8223	-75.4553
32.00	33998.75	37.8217	-75.4544
33.00	34868.61	37.8212	-75.4536
34.00	35734.75	37.8207	-75.4527
35.00	36577.50	37.8202	-75.4519
36.00	37416.86	37.8197	-75.4510
37.00	38246.16	37.8192	-75.4502
38.00	39065.26	37.8187	-75.4493
39.00	39874.04	37.8182	-75.4485
40.00	40674.12	37.8177	-75.4477
41.00	41465.38	37.8172	-75.4468
42.00	42245.35	37.8167	-75.4460
43.00	43020.91	37.8162	-75.4451
44.00	43770.56	37.8157	-75.4444
45.00	44522.07	37.8152	-75.4435
46.00	45261.81	37.8147	-75.4427
47.00	45992.73	37.8142	-75.4419
48.00	46712.39	37.8137	-75.4411
49.00	47422.50	37.8132	-75.4402
50.00	48124.03	37.8127	-75.4394
51.00	48814.51	37.8122	-75.4385
52.00	49496.49	37.8117	-75.4377
53.00	50167.09	37.8112	-75.4369
54.00	50826.59	37.8107	-75.4361

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*****************************************************************************************************
                    PROGRAM:   EDIT -- REVISED   FEBRUARY 22, 1983
*****************************************************************************************************
                  TAPE INFO:    NAME     I/O     UNIT     FILE#     RECORD LEN.

                                KA2130   INPUT    10        2
                                KA2145   OUTPUT   15        1           80
*****************************************************************************************************
                  INPUT DATA:    DELTAT     RECORD     HPEAK     LPEAK     RANGE

                                 0.677       24         462       132       30
HDR1:   46 WORDS. TAPE NUMBER   1 STREAM PCM4  S.L.O.O. T1-776

HDR2:  110 FRAMES PER RECORD    1220 WORDS PER RECORD

BATTERY VOLTAGE =  -0.0 + 0.010 WORD-6 COUNTS

TEMPERATURE C  VOLTS  ADJUSTMENT TO SER NO 400 CURVE TMPCAL
      -19.0    9.880  1.002
       25.0    3.860  0.998
       49.0    1.830  1.013
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					BATTERY CALIBRATION				TEMPERATURE CALIBRATION					
	FLT/LG	PAYLOAD	TAPE RCD	RUN DATE	VOLTS (UPPER)	TM CT	VOLTS (LOWER)	TM CT	DEG C. (LOWER)	TM VOLTS	DEG C.	TM VOLTS	DEG C. (UPPER)	TM VOLTS
-200.	325.0	489.	11684.	82984.	6.5	652.00	5.6	562.00	-19.0	9.88	25.0	3.86	49.0	1.83

C-4

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   T1(SEC)    T2(SEC)    T4(SEC)    T5(SEC)  AVG1  AVG2  AVG4  AVG5 MRKR BASE CMP1 CMP2 CMP4 CMP5 DELPK DELAV CMAV BATV TR C SM EX

CYCLE 2940:CYCLE REJECTED. LENGTH WAS  102.8201      43 SAMPLES     8     20     21     49     50 1799.6399 1799.7798 1902.4600
   1902.460   1902.530   1902.680   1902.815 173.2   59.6  46.3  62.8 462. 132. 177. 173. 130. 111. 0.495 0.495 136. 6.42 19.8 44. 43
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6550      60 SAMPLES     2     13     14     60     61 1902.9548 1903.0798 1903.6099
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7200      63 SAMPLES     3     17     18     64     65 1903.6099 1903.7698 1904.3298
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6799      62 SAMPLES     3     16     17     63     64 1904.3298 1904.4800 1905.0098
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6802      59 SAMPLES     3     17     18     60     61 1905.0098 1905.2000 1905.6899
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6699      59 SAMPLES     3     17     18     60     61 1905.6899 1905.8948 1906.3599
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6799      59 SAMPLES     3     18     19     60     61 1906.3599 1906.5398 1907.0398
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6802      60 SAMPLES     3     17     18     61     62 1907.0398 1907.2000 1907.7200
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6899      60 SAMPLES     3     18     19     61     62 1907.7200 1907.9148 1908.4099
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6799      60 SAMPLES     3     18     19     61     62 1908.4099 1908.5898 1909.0898
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7000      61 SAMPLES     3     18     19     62     63 1909.0898 1909.2698 1909.7898
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6902      60 SAMPLES     3     17     18     61     62 1909.7898 1909.9749 1910.4800
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6799      60 SAMPLES     3     18     19     61     62 1910.4800 1910.6599 1911.1599
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7151      61 SAMPLES     3     18     19     62     63 1911.1599 1911.3398 1911.8750
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6748      60 SAMPLES     3     17     18     61     62 1911.8750 1912.0298 1912.5498
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7002      62 SAMPLES     3     18     19     63     64 1912.5498 1912.7300 1913.2500
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7148      61 SAMPLES     3     18     19     62     63 1913.2500 1913.4600 1913.9648
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6951      62 SAMPLES     3     18     19     63     64 1913.9648 1914.1499 1914.6599
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7000      61 SAMPLES     3     16     17     62     63 1914.6599 1914.8[illegible] 1915.3599
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7100      62 SAMPLES     3     17     18     63     64 1915.3599 1915.5498 1916.0698
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7000      62 SAMPLES     3     16     17     63     64 1916.0698 1916.2500 1916.7698
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7002      61 SAMPLES     3     16     17     62     63 1916.7698 1916.9648 1917.4700
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7100      62 SAMPLES     3     16     17     63     64 1917.4700 1917.6499 1918.1799
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7249      62 SAMPLES     3     16     17     63     64 1918.1799 1918.3599 1918.9048
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7051      63 SAMPLES     3     16     17     64     65 1918.9048 1919.0698 1919.6099
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7200      63 SAMPLES     3     16     17     64     65 1919.6099 1919.7898 1920.3298
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7100      62 SAMPLES     3     16     17     63     64 1920.3298 1920.5098 1921.0398
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7002      62 SAMPLES     3     16     17     63     64 1921.0398 1921.2200 1921.7400
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7100      62 SAMPLES     3     16     17     63     64 1921.7400 1921.9348 1922.4500
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7100      62 SAMPLES     3     16     17     63     64 1922.4500 1922.6299 1923.1599
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7349      63 SAMPLES     3     16     17     64     65 1923.1599 1923.3398 1923.8948
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7051      63 SAMPLES     3     17     18     64     65 1923.8948 1924.0698 1924.5999
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7200      63 SAMPLES     3     16     17     64     65 1924.5999 1924.7798 1925.3198
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7200      63 SAMPLES     3     16     17     64     65 1925.3198 1925.5000 1926.0398
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7200      63 SAMPLES     3     17     18     64     65 1926.0398 1926.2300 1926.7598
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7202      63 SAMPLES     3     16     17     64     65 1926.7598 1926.9548 1927.4800
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7200      63 SAMPLES     3     17     18     64     65 1927.4800 1927.6699 1928.2000
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7249      62 SAMPLES     3     16     17     63     64 1928.2000 1928.3799 1928.9248
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7051      63 SAMPLES     3     17     18     64     65 1928.9248 1929.0999 1929.6299
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7000      62 SAMPLES     3     16     17     63     64 1929.6299 1929.8250 1930.3298
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7100      62 SAMPLES     3     16     17     63     64 1930.3298 1930.5098 1931.0398
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7200      63 SAMPLES     3     17     18     64     65 1931.0398 1931.2300 1931.7598
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7002      61 SAMPLES     3     16     17     62     63 1931.7598 1931.9548 1932.4600
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7100      62 SAMPLES     3     16     17     63     64 1932.4600 1932.6399 1933.1699
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7249      62 SAMPLES     3     16     17     63     64 1933.1699 1933.3499 1933.8948
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7051      63 SAMPLES     3     16     17     64     65 1933.8948 1934.0598 1934.5999
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7000      62 SAMPLES     3     16     17     63     64 1934.5999 1934.7798 1935.2998
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7400      64 SAMPLES     3     17     18     65     66 1935.2998 1935.5000 1936.0398
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7200      63 SAMPLES     3     16     17     64     65 1936.0398 1936.2200 1936.7598
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7202      63 SAMPLES     3     16     17     64     65 1936.7598 1936.9448 1937.4800
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7100      63 SAMPLES     3     17     18     64     65 1937.4800 1937.6699 1938.1899
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7249      62 SAMPLES     3     16     17     63     64 1938.1899 1938.3699 1938.9148
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6951      62 SAMPLES     3     16     17     63     64 1938.9148 1939.0798 1939.6099
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7100      62 SAMPLES     3     16     17     63     64 1939.6099 1939.7898 1940.3198
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7100      62 SAMPLES     3     16     17     63     64 1940.3198 1940.5000 1941.0298
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.7002      61 SAMPLES     3     16     17     62     63 1941.0298 1941.2100 1941.7300
CYCLE 2940:CYCLE REJECTED. LENGTH WAS     0.6899      61 SAMPLES     3     16     17     62     63 1941.7300 1941.9148 1942.4199
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                                        PROGRAM:  MERGE     UPDATED NOV, 1983
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                                        TAPE INFO:     NAME     UNIT     FILE#

                                            OZONE     KA2145    15        1
                                            RADAR     KA2131    16        1    PASS1
                                            MERGE     KA2123    10        1

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RADAR PED: -100.  325.  101.  112283.  163000.0   37.850   -75.480   11684.   82984.  WALLOPS ISLAND   LAUNCH TIME=  1800. SECONDS
  LAUNCH SITE   RH    RM    RS    RACOR    DD    DM    DS    DECOR    SH    SM    SS    HOUR    RESTR FLIGHT DATE AND TIME
 WALLOPS      15.00  47.00 32.41 252.09  -19.00 57.00 35.60 -779.00   4.00  1.00 39.32  16.00     0.00  325  NOV.  22, 1983 1630Z
                BEG. RECORD     # BAD RECORDS START      END
                    1                  0

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PEDIGREE:
-300.  325.0  82984. 15.00 47.00 32.41   252.09   -19.00    57.00    35.60  -779.00    4.00    1.00    39.32 0. 0. 0. 0. 0. 0.
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S0 SEC	CYCLE	SAM	TEMC	S0	S1	S2	S3	MARK	BATV	COM0	COM1	COM2	COM3	CMAVE	S0 ALT	S1 ALT	S2 ALT	S3 ALT	SZA
1902.460	0.495	44.	19.8	173.	60.	46.	63.	462.	6.42	177.	173.	130.	111.	136.0	71354.0	71368.1	71398.0	71424.9	58.02
1957.490	0.630	55.	20.9	808.	822.	815.	782.	44[illegible].	6.38	496.	504.	466.	481.	479.6	68282.9	68241.4	68203.3	68164.1	57.97
1958.120	0.580	51.	20.9	813.	828.	811.	775.	448.	6.38	504.	468.	394.	396.	429.2	68128.7	68091.8	68047.5	68020.5	57.97
1958.700	0.600	52.	20.9	791.	820.	821.	784.	449.	6.38	401.	381.	323.	353.	373.2	67986.0	67945.3	67909.6	67869.7	57.97
1959.300	0.595	53.	20.9	806.	824.	811.	783.	448.	6.38	458.	419.	415.	430.	437.9	67837.5	67800.1	67762.7	67725.4	57.97
1959.895	0.585	54.	20.9	804.	830.	823.	787.	448.	6.38	498.	450.	427.	454.	450.3	67689.4	67653.4	67616.4	67579.6	57.97
1960.480	0.600	54.	20.9	798.	820.	810.	769.	448.	6.38	438.	457.	430.	386.	424.3	67545.0	67505.6	67468.6	67432.8	57.97
1961.080	0.590	54.	20.9	803.	830.	823.	782.	448.	6.38	425.	457.	427.	403.	428.4	67396.6	67361.2	67323.2	67282.9	57.97
1961.670	0.600	54.	20.9	800.	823.	812.	775.	448.	6.38	442.	490.	449.	413.	440.0	67247.7	67206.2	67166.3	67133.8	57.97
1962.270	0.595	53.	20.9	800.	824.	822.	789.	448.	6.38	433.	456.	434.	406.	430.5	67100.2	67064.4	67028.6	66992.6	57.97
1962.865	0.585	54.	20.9	811.	827.	812.	781.	448.	6.38	420.	435.	396.	360.	399.9	66957.5	66922.2	66883.8	66842.6	57.97
1963.450	0.600	54.	20.9	798.	814.	805.	774.	448.	6.38	392.	395.	366.	375.	379.0	66808.8	66767.1	66725.4	66690.2	57.97
1964.050	0.600	55.	21.0	804.	829.	821.	781.	448.	6.38	377.	420.	411.	347.	387.3	66652.7	66614.6	66576.6	66538.6	57.97
1964.650	0.590	53.	21.0	798.	818.	806.	772.	448.	6.38	388.	417.	364.	339.	373.2	66500.7	66459.1	66418.9	66387.4	57.97
1965.240	0.605	54.	21.0	803.	808.	804.	773.	448.	6.38	393.	363.	344.	366.	361.7	66351.9	66311.5	66273.7	66235.7	57.97
1965.845	0.585	54.	21.0	800.	815.	811.	777.	448.	6.38	362.	337.	364.	309.	331.3	66199.2	66159.0	66122.8	66085.[illegible]	57.97
1966.430	0.600	54.	21.0	805.	823.	817.	782.	447.	6.38	307.	387.	375.	322.	354.3	66052.7	66012.9	65975.6	65939.5	57.97
1967.030	0.590	54.	21.0	806.	824.	814.	774.	447.	6.38	391.	451.	384.	371.	399.2	65903.5	65866.1	65828.6	65791.3	57.97
1967.620	0.600	54.	21.0	799.	815.	799.	779.	447.	6.38	392.	356.	319.	401.	363.4	65756.4	65719.2	65680.7	65644.7	57.97
1968.220	0.595	53.	21.0	795.	809.	811.	779.	447.	6.38	354.	320.	425.	408.	377.6	65607.6	65573.0	65533.7	65496.7	57.97
1968.815	0.585	54.	21.1	803.	827.	824.	780.	446.	6.38	404.	431.	449.	382.	407.4	65461.0	65421.7	65386.3	65352.1	57.97
1969.400	0.595	53.	21.0	801.	808.	802.	764.	447.	6.38	346.	339.	343.	321.	331.1	65317.9	65283.9	65244.8	65206.9	57.97
1969.995	0.575	53.	21.0	789.	819.	819.	781.	447.	6.38	314.	367.	378.	385.	368.2	65172.7	65139.2	65102.1	65064.8	57.97
1970.570	0.590	54.	21.0	801.	808.	809.	778.	447.	6.38	372.	385.	406.	337.	365.3	65030.1	64990.3	64954.4	64918.8	57.96
1971.160	0.590	53.	21.1	800.	824.	813.	768.	446.	6.38	324.	323.	257.	266.	291.0	64884.5	64847.9	64811.3	64774.9	57.96
1971.750	0.590	54.	21.0	792.	813.	815.	785.	447.	6.38	334.	314.	336.	382.	343.4	64740.9	64698.6	64663.6	64629.8	57.96
1972.340	0.615	54.	21.0	804.	806.	807.	773.	446.	6.38	370.	335.	379.	357.	355.3	64598.5	64562.2	64523.8	64484.2	57.96
1972.955	0.585	54.	21.0	808.	823.	808.	776.	446.	6.38	314.	265.	282.	306.	284.7	64450.7	64418.4	64382.6	64347.0	57.96
1973.540	0.590	54.	21.0	790.	814.	821.	776.	447.	6.38	274.	327.	390.	332.	336.1	64311.2	64277.9	64234.1	64205.7	57.96
1974.130	0.590	53.	21.1	799.	813.	811.	774.	446.	6.38	363.	395.	392.	366.	371.8	64171.5	64136.2	64098.6	64065.7	57.96
1974.720	0.590	54.	21.1	807.	820.	807.	769.	446.	6.38	338.	327.	310.	311.	319.1	64032.8	63994.0	63959.8	63926.5	57.96
1975.310	0.625	55.	21.1	797.	817.	818.	775.	446.	6.38	367.	361.	321.	391.	356.4	63893.3	63855.2	63817.3	63779.5	57.96
1975.935	0.585	54.	21.1	799.	810.	806.	768.	446.	6.38	363.	322.	364.	359.	341.8	63745.2	63713.6	63678.8	63644.1	57.96
1976.520	0.590	54.	21.1	802.	825.	816.	772.	446.	6.38	341.	326.	340.	361.	341.7	63609.5	63577.2	63541.5	63507.0	57.96
1977.110	0.600	54.	21.1	793.	810.	812.	771.	446.	6.38	334.	352.	413.	376.	367.8	63473.5	63438.8	63401.8	63369.4	57.96
1977.710	0.590	54.	21.1	803.	826.	823.	777.	446.	6.38	344.	381.	369.	333.	354.5	63334.8	63299.1	63265.9	63231.7	57.96
1978.300	0.615	54.	21.1	799.	811.	809.	771.	446.	6.38	349.	374.	370.	368.	368.3	63199.9	63165.8	63129.5	63093.2	57.96
1978.915	0.585	54.	21.1	798.	819.	815.	776.	446.	6.38	402.	394.	375.	385.	387.5	63060.2	63029.4	62994.9	62960.3	57.96
1979.500	0.590	54.	21.1	808.	827.	822.	776.	445.	6.38	390.	366.	363.	374.	371.6	62925.7	62893.5	62859.0	62823.5	57.96
1980.090	0.600	54.	21.2	808.	819.	811.	772.	445.	6.38	397.	394.	400.	427.	400.0	62790.4	62756.4	62720.1	62686.2	57.96
1980.690	0.590	54.	21.2	794.	815.	809.	772.	445.	6.38	370.	372.	415.	416.	389.6	62654.7	62619.9	62586.3	62553.9	57.96
1981.280	0.615	54.	21.2	798.	816.	815.	775.	445.	6.38	379.	421.	431.	434.	419.9	62522.7	62489.3	62453.7	62418.0	57.96
1981.895	0.585	54.	21.2	807.	825.	822.	781.	445.	6.38	429.	468.	449.	385.	426.0	62385.8	62355.7	62321.7	62287.9	57.96
1982.480	0.590	54.	21.2	813.	828.	813.	771.	445.	6.38	394.	399.	371.	366.	383.5	62254.1	62222.6	62189.0	62154.3	57.96
1983.070	0.600	54.	21.2	805.	817.	803.	771.	445.	6.38	417.	415.	388.	431.	413.6	62122.3	62089.8	62055.1	62022.8	57.96
1983.670	0.580	53.	21.2	801.	816.	810.	772.	445.	6.38	437.	411.	378.	352.	382.1	61992.6	61959.1	61926.8	61897.1	57.96
1984.250	0.615	54.	21.2	797.	820.	816.	776.	445.	6.37	350.	351.	383.	395.	372.7	61866.1	61830.8	61795.4	61759.9	57.96
1984.865	0.565	53.	21.2	812.	828.	816.	767.	445.	6.37	392.	430.	436.	401.	414.0	61730.1	61699.4	61667.6	61637.2	57.96
1985.430	0.600	54.	21.2	802.	821.	806.	763.	445.	6.37	403.	359.	361.	384.	372.4	61606.7	61572.1	61539.8	61508.7	57.96
1986.030	0.580	53.	21.2	799.	820.	815.	773.	444.	6.37	390.	403.	450.	461.	431.0	61477.8	61446.0	61414.4	61385.0	57.96
1986.610	0.600	54.	21.2	812.	833.	819.	769.	444.	6.37	464.	461.	404.	408.	430.5	61355.7	61322.3	61281.7	61257.7	57.96
1987.210	0.580	53.	21.2	801.	807.	811.	767.	444.	6.37	428.	348.	431.	449.	409.5	61230.6	61199.5	61168.3	61139.1	57.96
1987.790	0.590	53.	21.2	800.	817.	819.	774.	444.	6.37	428.	447.	481.	473.	459.5	61110.0	61075.6	61045.1	61015.4	57.96
1988.380	0.605	54.	21.3	811.	832.	822.	775.	444.	6.37	467.	459.	425.	445.	444.9	60985.7	60951.9	60920.4	60883.9	57.96
1988.985	0.575	53.	21.3	809.	820.	811.	763.	444.	6.37	446.	440.	476.	428.	444.9	60859.0	60832.2	60802.8	60771.5	57.96
1989.560	0.580	53.	21.3	800.	819.	813.	768.	444.	6.37	461.	491.	479.	462.	475.4	60746.2	60716.9	60688.4	60658.7	57.96
1990.140	0.590	53.	21.3	806.	819.	817.	775.	444.	6.37	493.	447.	503.	504.	481.0	60630.6	60599.0	60567.3	60535.4	57.95
1990.730	0.600	54.	21.3	813.	833.	823.	772.	444.	6.37	485.	488.	488.	476.	477.9	60505.7	60468.7	60436.4	60409.8	57.95

FLT. NO. RUN DATE SMOOTH

-400. 325. 82984.

TAPE INFORMATION:

NAME	I/O	FILE	UNIT
KA2123	INPUT	1	10
KA2145	OUTPUT	2	15

UPPER HEIGHT LIMIT: 67.0 KM
LOWER HEIGHT LIMIT: 16.0 KM RATIOS= 1 MODE= 0
MINIMUM ACCEPTABLE COMPENSATION WORD = 281.0

ZERO OFF-SETS:	S0	S1	S2	S3	TA	TB	S2B	S3B
	0.0	0.0	8.5	16.3	18.0	4.0	1.7	9.9

LOGFIT 2800: NPTS = 260 NOLD = 127 N = 125 FP = 2. ALT = 23. A = -0.2179 B = 0.3631 TWO S.D. = 1.730

SI(CTS)	LNSI	Y	DIF																
2.4	0.9	0.5	0.32	2.0	0.7	0.5	0.15	2.6	1.0	0.5	0.42	6.1	1.8	0.5	1.28	2.8	1.0	0.5	0.50
1.5	0.4	0.5	-0.12	1.8	0.6	0.5	0.07	2.1	0.7	0.5	0.23	3.5	1.3	0.5	0.75	-1.5	0.0	0.0	0.0
4.5	1.5	0.5	0.99	1.5	0.4	0.5	-0.09	4.6	1.5	0.5	1.02	0.6	-0.5	0.5	-0.97	1.5	0.4	0.5	-0.10
1.5	0.4	0.5	-0.06	1.3	0.3	0.5	-0.23	3.5	1.3	0.5	0.78	1.5	0.4	0.5	-0.08	1.5	0.4	0.5	-0.07
2.5	0.9	0.5	0.46	-0.5	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	0.5	-0.6	0.5	-1.09
-99.0	0.0	0.0	0.0	-1.5	0.0	0.0	0.0	-1.4	0.0	0.0	0.0	2.5	0.9	0.4	0.48	0.5	-0.7	0.4	-1.18
5.6	1.7	0.4	1.27	4.1	1.4	0.4	0.98	2.7	1.0	0.4	0.54	1.5	0.4	0.4	-0.04	0.5	-0.7	0.4	-1.12
0.5	-0.6	0.4	-1.05	1.1	0.1	0.4	-0.33	3.5	1.2	0.4	0.83	-0.5	0.0	0.0	0.0	-0.5	0.0	0.0	0.0
0.9	-0.1	0.4	-0.55	-0.4	0.0	0.0	0.0	0.6	-0.5	0.4	-0.91	4.7	1.5	0.4	1.14	2.6	1.0	0.4	0.55
-2.2	0.0	0.0	0.0	0.4	-0.8	0.4	-1.21	0.6	-0.6	0.4	-0.98	1.5	0.4	0.4	0.03	2.6	1.0	0.4	0.59
-2.5	0.0	0.0	0.0	0.4	-1.0	0.4	-1.35	2.5	0.9	0.4	0.54	2.5	0.9	0.4	0.56	-1.4	0.0	0.0	0.0
4.5	1.5	0.4	1.14	-0.4	0.0	0.0	0.0	-1.4	0.0	0.0	0.0	2.3	0.8	0.4	0.48	4.1	1.4	0.4	1.05
0.6	-0.6	0.4	-0.91	-1.9	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	1.5	0.4	0.3	0.05	0.4	-0.9	0.3	-1.28
2.6	1.0	0.3	0.63	0.4	-0.9	0.3	-1.22	2.5	0.9	0.3	0.59	0.5	-0.6	0.3	-0.95	0.5	-0.7	0.3	-1.05
4.6	1.5	0.3	1.20	1.5	0.4	0.3	0.08	-0.5	0.0	0.0	0.0	2.3	0.8	0.3	0.51	-3.4	0.0	0.0	0.0
-0.5	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	-1.4	0.0	0.0	0.0	0.9	-0.1	0.3	-0.44	1.6	0.5	0.3	0.16
-0.5	0.0	0.0	0.0	-0.4	0.0	0.0	0.0	-1.5	0.0	0.0	0.0	0.4	-0.8	0.3	-1.09	-2.3	0.0	0.0	0.0
-0.9	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	-2.3	0.0	0.0	0.0	-1.5	0.0	0.0	0.0
-0.4	0.0	0.0	0.0	0.4	-0.8	0.3	-1.08	-0.5	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	-0.5	0.0	0.0	0.0
0.5	-0.6	0.2	-0.87	-0.9	0.0	0.0	0.0	0.5	-0.7	0.2	-0.97	-0.6	0.0	0.0	0.0	-1.4	0.0	0.0	0.0
-2.5	0.0	0.0	0.0	-99.0	0.0	0.0	0.0	0.2	-1.4	0.2	-1.63	-1.5	0.0	0.0	0.0	-3.4	0.0	0.0	0.0
-0.5	0.0	0.0	0.0	0.5	-0.7	0.2	-0.87	-0.1	0.0	0.0	0.0	1.5	0.4	0.2	0.22	0.5	-0.7	0.2	-0.87
1.6	0.5	0.2	0.29	2.4	0.9	0.2	0.66	3.5	1.3	0.2	1.07	4.5	1.5	0.2	1.31	2.6	1.0	0.2	0.78
1.7	0.5	0.2	0.34	0.6	-0.6	0.2	-0.78	-2.1	0.0	0.0	0.0	0.5	-0.7	0.2	-0.91	0.6	-0.6	0.2	-0.74
-3.5	0.0	0.0	0.0	-1.5	0.0	0.0	0.0	-2.5	0.0	0.0	0.0	-1.6	0.0	0.0	0.0	-0.6	0.0	0.0	0.0
-1.4	0.0	0.0	0.0	-1.6	0.0	0.0	0.0	2.5	0.9	0.2	0.78	2.5	0.9	0.1	0.79	1.4	0.4	0.1	0.22
2.4	0.9	0.1	0.74	-3.5	0.0	0.0	0.0	1.8	0.6	0.1	0.46	0.5	-0.7	0.1	-0.79	4.5	1.5	0.1	1.38
0.5	-0.7	0.1	-0.82	-1.4	0.0	0.0	0.0	-0.8	0.0	0.0	0.0	0.5	-0.6	0.1	-0.75	-2.5	0.0	0.0	0.0
-0.2	0.0	0.0	0.0	0.6	-0.4	0.1	-0.56	1.4	0.3	0.1	0.24	-1.5	0.0	0.0	0.0	-0.4	0.0	0.0	0.0
-0.5	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	-0.8	0.0	0.0	0.0	-1.4	0.0	0.0	0.0	-1.5	0.0	0.0	0.0
-2.4	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	-1.7	0.0	0.0	0.0	-2.3	0.0	0.0	0.0	-2.4	0.0	0.0	0.0

-1.2	0.0	0.0	0.0	-3.3	0.0	0.0	0.0	1.8	0.6	0.1	0.48	-0.4	0.0	0.0	0.0	-2.2	0.0	0.0	0.0
-2.2	0.0	0.0	0.0	3.7	1.3	0.1	1.20	3.4	1.2	0.1	1.12	0.7	-0.3	0.1	-0.42	-0.8	0.0	0.0	0.0
0.6	-0.4	0.1	-0.55	-1.3	0.0	0.0	0.0	-0.3	0.0	0.0	0.0	0.9	-0.1	0.1	-0.25	-1.1	0.0	0.0	0.0
0.2	-1.7	0.1	-1.80	-0.3	0.0	0.0	0.0	-0.4	0.0	0.0	0.0	-99.0	0.0	0.0	0.0	-0.3	0.0	0.0	0.0
2.0	0.7	0.1	0.58	0.6	-0.5	0.1	-0.60	-0.3	0.0	0.0	0.0	3.2	1.2	0.1	1.08	0.6	-0.5	0.1	-0.58
0.8	-0.3	0.1	-0.34	-1.1	0.0	0.0	0.0	1.5	0.4	0.1	0.34	-0.4	0.0	0.0	0.0	-0.3	0.0	0.0	0.0
0.7	-0.3	0.1	-0.38	-1.2	0.0	0.0	0.0	-4.0	0.0	0.0	0.0	-99.0	0.0	0.0	0.0	-1.3	0.0	0.0	0.0
-1.2	0.0	0.0	0.0	-3.3	0.0	0.0	0.0	-1.4	0.0	0.0	0.0	1.9	0.6	0.1	0.56	0.7	-0.4	0.1	-0.47
1.5	0.4	0.1	0.35	-0.3	0.0	0.0	0.0	-0.0	0.0	0.0	0.0	-3.2	0.0	0.0	0.0	1.8	0.6	0.1	0.54
-0.3	0.0	0.0	0.0	0.7	-0.4	0.0	-0.43	1.5	0.4	0.0	0.35	0.5	-0.6	0.0	-0.69	0.7	-0.4	0.0	-0.42
-0.3	0.0	0.0	0.0	-1.4	0.0	0.0	0.0	0.8	-0.2	0.0	-0.21	-1.1	0.0	0.0	0.0	-1.3	0.0	0.0	0.0
-0.2	0.0	0.0	0.0	-1.3	0.0	0.0	0.0	-1.7	0.0	0.0	0.0	-0.5	0.0	0.0	0.0	-1.1	0.0	0.0	0.0
0.8	-0.3	0.0	-0.31	1.3	0.3	0.0	0.26	1.7	0.5	0.0	0.50	0.7	-0.3	0.0	-0.35	1.7	0.5	0.0	0.50
-1.0	0.0	0.0	0.0	0.6	-0.5	0.0	-0.53	-1.8	0.0	0.0	0.0	1.7	0.5	0.0	0.52	0.7	-0.4	0.0	-0.39
-1.7	0.0	0.0	0.0	-1.4	0.0	0.0	0.0	-1.3	0.0	0.0	0.0	-2.3	0.0	0.0	0.0	-1.4	0.0	0.0	0.0

ORIGINAL PAGE IS
OF POOR QUALITY

ALT-KM	SECONDS	SZA	TMP C	CYCLE	BATTV	COMP
67.	1962.7	57.97	20.9	0.593	6.38	390.
66.	1966.6	57.97	21.0	0.592	6.38	403.
65.	1970.7	57.96	21.1	0.591	6.38	413.
64.	1974.9	57.96	21.1	0.590	6.38	415.
63.	1979.2	57.96	21.1	0.589	6.38	412.
62.	1983.6	57.96	21.2	0.589	6.38	410.
61.	1988.3	57.96	21.3	0.588	6.37	411.
60.	1993.3	57.95	21.3	0.587	6.37	420.
59.	1998.5	57.95	21.4	0.586	6.37	435.
58.	2004.2	57.95	21.4	0.584	6.37	448.
57.	2010.4	57.95	21.5	0.583	6.37	456.
56.	2017.1	57.95	21.5	0.581	6.36	462.
55.	2024.2	57.94	21.6	0.581	6.36	466.
54.	2031.9	57.94	21.7	0.581	6.36	462.
53.	2040.2	57.94	21.7	0.581	6.36	483.
52.	2049.1	57.94	21.8	0.582	6.35	493.
51.	2058.9	57.93	21.8	0.582	6.35	489.
50.	2069.2	57.93	21.9	0.583	6.35	485.
49.	2080.5	57.93	22.0	0.584	6.34	474.
48.	2092.7	57.92	22.0	0.585	6.34	474.
47.	2105.7	57.92	22.1	0.585	6.34	456.
46.	2120.1	57.92	22.1	0.585	6.33	464.
45.	2135.5	57.92	22.2	0.586	6.33	484.
44.	2151.9	57.91	22.2	0.587	6.33	495.
43.	2169.7	57.91	22.3	0.588	6.32	480.
42.	2188.6	57.91	22.3	0.589	6.32	479.
41.	2209.2	57.90	22.3	0.590	6.31	473.
40.	2231.1	57.90	22.3	0.590	6.31	501.
39.	2254.9	57.89	22.3	0.591	6.30	474.
38.	2280.9	57.89	22.3	0.593	6.30	488.
37.	2308.6	57.88	22.3	0.595	6.29	479.
36.	2338.5	57.88	22.3	0.595	6.29	459.
35.	2371.1	57.87	22.2	0.594	6.28	462.
34.	2405.7	57.87	22.1	0.596	6.27	483.
33.	2443.7	57.86	22.1	0.596	6.26	497.
32.	2484.6	57.86	21.9	0.600	6.26	476.
31.	2529.0	57.85	21.7	0.606	6.25	481.
30.	2577.3	57.85	21.4	0.612	6.24	496.
29.	2629.6	57.85	21.1	0.618	6.23	488.
28.	2685.9	57.85	20.8	0.620	6.22	485.
27.	2747.3	57.84	20.2	0.632	6.21	479.
26.	2815.3	57.84	19.7	0.651	6.20	483.
25.	2889.2	57.85	18.9	0.666	6.19	495.

24.	2969.5	57.85	18.2	0.705	6.17	464.
23.	3057.1	57.85	17.2	0.743	6.16	496.
22.	3155.3	57.85	16.0	0.771	6.14	467.
21.	3265.0	57.86	14.4	0.792	6.12	474.
20.	3388.1	57.87	12.9	0.803	6.10	480.
19.	3531.5	57.89	10.9	0.802	6.08	472.
18.	3701.8	57.92	8.4	0.758	6.06	456.

FILTER POSITION 3

KM	CNT/RAT	STDCTS	STDX	SLOPE	START	END	DIFF	BASEIO	STDCTS	STDX	ABSORP	DABSORP	SETSDX	COREL	USD	PTS
67.	768.507	2.1841	0.28	-3.2129	67.28	56.21	11.07	734.606	1.0172	0.14	-0.0042	0.0002	0.79	0.87	86.	93.
66.	765.301	2.0231	0.26	-3.1995	67.28	56.21	11.07	734.606	1.0172	0.14	-0.0042	0.0002	0.79	0.87	86.	93.
65.	762.109	1.8672	0.24	-3.1861	67.28	56.21	11.07	734.606	1.0172	0.14	-0.0042	0.0002	0.79	0.87	86.	93.
64.	758.929	1.7182	0.23	-3.1728	67.28	56.21	11.07	734.606	1.0172	0.14	-0.0042	0.0002	0.79	0.87	86.	93.
63.	755.763	1.5770	0.21	-3.1596	67.28	56.21	11.07	734.606	1.0172	0.14	-0.0042	0.0002	0.79	0.87	86.	93.
62.	752.610	1.4455	0.19	-3.1464	67.28	56.21	11.07	734.606	1.0172	0.14	-0.0042	0.0002	0.79	0.87	86.	93.
61.	741.198	1.4611	0.20	-3.2716	67.28	55.96	11.32	732.889	1.1022	0.15	-0.0044	0.0002	0.90	0.87	90.	96.
60.	744.497	1.6053	0.22	-4.0531	66.54	55.23	11.31	725.396	1.2224	0.17	-0.0054	0.0003	1.03	0.89	95.	100.
59.	739.701	1.5745	0.21	-5.0687	65.21	54.52	10.69	717.344	1.1897	0.17	-0.0069	0.0003	0.99	0.92	94.	100.
58.	733.550	1.7335	0.24	-6.4390	63.78	53.79	9.99	706.956	1.3073	0.18	-0.0088	0.0003	1.19	0.93	94.	100.
57.	725.397	2.0719	0.29	-8.3974	62.42	53.09	9.33	693.306	1.5604	0.23	-0.0116	0.0004	1.28	0.93	97.	100.
56.	714.447	1.8703	0.26	-11.4007	60.88	52.30	8.59	673.473	1.3713	0.20	-0.0160	0.0004	1.23	0.96	95.	100.
55.	701.375	1.7893	0.26	-13.6018	59.49	51.55	7.94	655.995	1.3106	0.20	-0.0194	0.0005	1.32	0.97	94.	100.
54.	684.662	2.5086	0.37	-17.1110	58.13	50.78	7.34	631.781	1.8081	0.29	-0.0250	0.0007	1.63	0.96	97.	100.
53.	662.542	2.8168	0.43	-22.6247	56.72	49.95	6.77	597.105	1.9543	0.33	-0.0341	0.0009	1.76	0.97	100.	100.
52.	638.616	2.5196	0.39	-27.3041	55.47	49.17	6.29	565.907	1.7276	0.31	-0.0428	0.0009	1.76	0.98	95.	100.
51.	605.636	2.9012	0.48	-34.3810	54.15	48.34	5.80	520.858	1.8950	0.36	-0.0568	0.0012	2.00	0.98	98.	100.
50.	568.904	2.6948	0.47	-41.0060	52.96	47.56	5.40	477.178	1.7343	0.36	-0.0721	0.0012	2.23	0.99	93.	100.
49.	520.717	3.3932	0.65	-48.7669	51.68	46.69	4.99	419.427	2.0948	0.50	-0.0937	0.0018	2.74	0.98	96.	100.
48.	466.414	3.0540	0.65	-58.6968	50.45	45.85	4.59	355.964	1.7734	0.50	-0.1258	0.0020	2.83	0.99	95.	100.
47.	402.661	2.7564	0.68	-66.7901	49.28	45.02	4.25	290.115	1.4993	0.52	-0.1659	0.0023	2.94	0.99	97.	100.
46.	334.921	2.0618	0.62	-68.8004	48.06	44.12	3.94	227.808	1.0602	0.47	-0.2054	0.0021	2.50	0.99	99.	100.
45.	268.398	1.3917	0.52	-65.3661	46.90	43.25	3.65	175.368	0.6924	0.39	-0.2435	0.0019	2.19	1.00	96.	100.
44.	204.774	1.3147	0.64	-59.8449	45.78	42.37	3.41	127.050	0.6173	0.49	-0.2922	0.0026	2.68	1.00	96.	100.
43.	149.928	0.8121	0.54	-50.2097	44.65	41.47	3.18	89.903	0.3728	0.41	-0.3349	0.0023	2.36	1.00	97.	100.
42.	104.725	0.5905	0.56	-39.3322	43.55	40.58	2.97	61.513	0.2662	0.43	-0.3756	0.0025	2.62	1.00	95.	100.
41.	70.996	0.5601	0.79	-28.9391	42.43	39.67	2.76	41.252	0.2496	0.61	-0.4076	0.0038	3.85	1.00	95.	100.
40.	47.409	0.5569	1.17	-18.9932	41.33	38.77	2.55	28.982	0.2612	0.90	-0.4006	0.0061	5.24	0.99	95.	100.
39.	33.379	0.5864	1.76	-11.5114	40.21	37.84	2.37	22.402	0.2979	1.33	-0.3449	0.0098	7.36	0.96	97.	100.
38.	23.585	0.5024	2.13	-7.6657	39.10	36.91	2.19	16.555	0.2660	1.61	-0.3250	0.0127	8.94	0.93	98.	100.
37.	18.036	0.5150	2.86	-4.8188	38.04	36.00	2.04	13.821	0.3001	2.17	-0.2672	0.0183	12.49	0.83	97.	100.
36.	14.553	0.6292	4.32	-2.5724	37.08	35.00	2.08	12.195	0.4032	3.31	-0.1768	0.0271	21.50	0.54	104.	110.
35.	11.504	0.5868	5.10	-1.8580	36.08	33.97	2.11	9.744	0.3750	3.85	-0.1615	0.0315	25.98	0.43	116.	120.
34.	8.872	0.4649	5.24	-2.3039	35.10	32.98	2.12	6.816	0.2704	3.97	-0.2597	0.0326	27.93	0.58	125.	130.
33.	7.327	0.4015	5.48	-0.7250	34.09	31.95	2.11	6.622	0.2755	4.16	-0.0990	0.0337	31.14	0.25	135.	140.
32.	6.499	0.3138	4.83	-0.5599	33.07	30.97	2.10	5.949	0.2168	3.64	-0.0862	0.0299	30.77	0.24	143.	150.
31.	4.914	0.3270	6.65	-2.2393	32.08	29.99	2.09	3.103	0.1572	5.07	-0.4557	0.0409	49.55	0.67	152.	160.
30.	4.280	0.3457	8.08	-0.1229	31.05	28.99	2.06	4.158	0.2511	6.04	-0.0287	0.0507	58.27	0.04	165.	170.
29.	4.455	0.3340	7.50	-0.5837	30.04	28.00	2.04	3.911	0.2212	5.66	-0.1310	0.0471	58.22	0.21	172.	180.
28.	3.643	0.3272	8.98	-0.8892	29.02	27.02	2.00	2.869	0.1952	6.80	-0.2441	0.0566	77.36	0.31	174.	190.
27.	2.763	0.2768	10.75	-0.4810	28.06	26.01	2.05	2.325	0.1880	8.09	-0.1741	0.0667	88.66	0.19	186.	210.
26.	2.206	0.2634	11.94	-0.7772	27.02	25.01	2.01	1.558	0.1405	9.02	-0.3523	0.0735	88.87	0.34	176.	220.
25.	1.638	0.2101	12.82	-0.3999	26.02	24.02	2.00	1.29[illegible]	0.1250	9.69	-0.2441	0.0792	83.62	0.24	155.	230.
24.	1.450	0.2610	18.00	-0.0246	25.01	23.00	2.01	1.426	0.1934	13.57	-0.0169	0.1063	125.49	0.01	128.	240.
23.	1.252	0.2044	16.33	-0.2784	24.07	21.99	2.08	1.001	0.1270	12.69	-0.2224	0.0920	145.04	0.22	114.	260.
22.	-0.803	0.0	0.0	0.0	23.08	21.01	2.07	0.0	0.0	0.0	0.0	0.0	65.21	0.0	266.	280.
21.	-2.248	0.0	0.0	0.0	22.06	20.02	2.04	0.0	0.0	0.0	0.0	0.0	77.55	0.0	283.	300.
20.	-3.441	0.0	0.0	0.0	21.07	19.06	2.01	0.0	0.0	0.0	0.0	0.0	59.12	0.0	319.	330.
19.	-4.114	0.0	0.0	0.0	20.11	18.09	2.02	0.0	0.0	0.0	0.0	0.0	47.06	0.0	370.	390.

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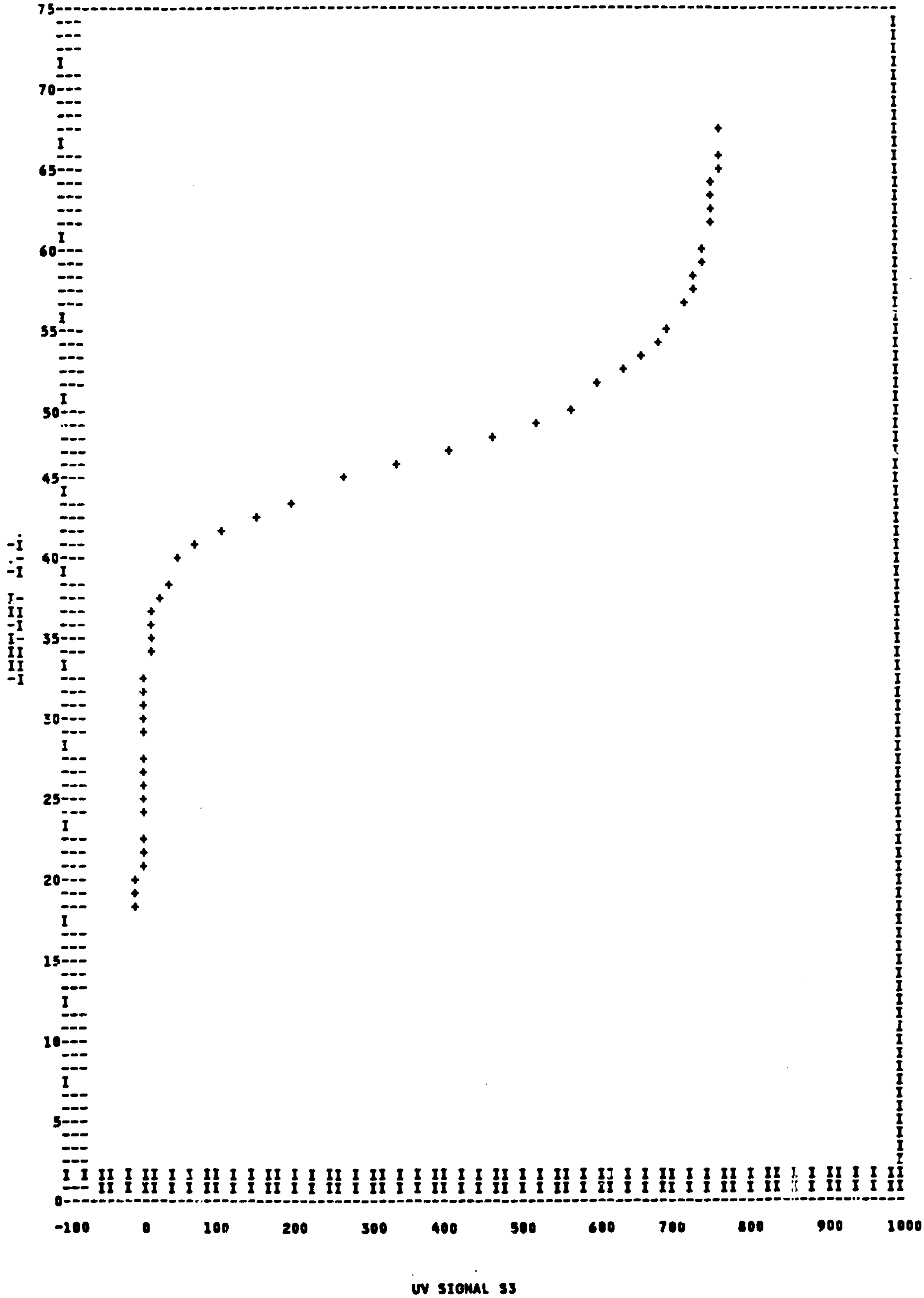

FILTER POSITION 30 (DIVIDED BY SG)

KM	CNT/RAT	STDCTS	STDX	SLOPE	START	END	DIFF	BASEIO	STDCTS	STDX	ABSORP	DABSORP	SETSDX	COREL	USD	PTS
67.	0.958	0.0036	0.38	-0.0045	67.28	56.21	11.07	0.911	0.0016	0.18	-0.0047	0.0003	0.99	0.85	89.	93.
66.	0.954	0.0033	0.35	-0.0044	67.28	56.21	11.07	0.911	0.0016	0.18	-0.0047	0.0003	0.99	0.85	89.	93.
65.	0.949	0.0031	0.32	-0.0044	67.28	56.21	11.07	0.911	0.0016	0.18	-0.0047	0.0003	0.99	0.85	89.	93.
64.	0.945	0.0028	0.30	-0.0044	67.28	56.21	11.07	0.911	0.0016	0.18	-0.0047	0.0003	0.99	0.85	89.	93.
63.	0.941	0.0026	0.28	-0.0044	67.28	56.21	11.07	0.911	0.0016	0.18	-0.0047	0.0003	0.99	0.85	89.	93.
62.	0.936	0.0024	0.25	-0.0044	67.28	56.21	11.07	0.911	0.0016	0.18	-0.0047	0.0003	0.99	0.85	89.	93.
61.	0.931	0.0023	0.24	-0.0047	67.28	55.96	11.32	0.908	0.0017	0.19	-0.0050	0.0003	1.03	0.86	93.	96.

KM	CNT/RAT	STDCTS	STDX	SLOPE	START	END	DIFF	BASEIO	STDCTS	STDX	ABSORP	DABSORP	SETSDX	COREL	USD	PTS
60.	0.926	0.0022	0.24	-0.0057	66.54	55.23	11.31	0.899	0.0016	0.18	-0.0061	0.0003	1.04	0.90	96.	100.
59.	0.920	0.0022	0.24	-0.0072	65.21	54.52	10.69	0.868	0.0016	0.18	-0.0078	0.0003	1.11	0.92	95.	100.
58.	0.911	0.0023	0.26	-0.0083	63.78	53.79	9.99	0.876	0.0018	0.20	-0.0091	0.0004	1.24	0.93	95.	100.
57.	0.900	0.0026	0.29	-0.0109	62.42	53.09	9.33	0.858	0.0020	0.23	-0.0122	0.0005	1.37	0.94	94.	100.
56.	0.886	0.0029	0.33	-0.0141	60.88	52.30	8.59	0.835	0.0021	0.25	-0.0159	0.0006	1.44	0.95	97.	100.
55.	0.868	0.0031	0.35	-0.0179	59.49	51.55	7.94	0.808	0.0022	0.27	-0.0206	0.0006	1.54	0.96	98.	100.
54.	0.847	0.0031	0.37	-0.0224	58.13	50.78	7.34	0.778	0.0022	0.29	-0.0264	0.0007	1.58	0.97	98.	100.
53.	0.821	0.0032	0.39	-0.0284	56.72	49.95	6.77	0.739	0.0022	0.30	-0.0346	0.0008	1.64	0.97	98.	100.
52.	0.789	0.0034	0.43	-0.0341	55.47	49.17	6.29	0.698	0.0023	0.33	-0.0432	0.0009	1.80	0.98	97.	100.
51.	0.749	0.0034	0.46	-0.0424	54.15	48.34	5.80	0.644	0.0023	0.35	-0.0566	0.0011	1.95	0.98	98.	100.
50.	0.702	0.0032	0.45	-0.0499	52.96	47.56	5.40	0.591	0.0021	0.35	-0.0710	0.0012	1.99	0.99	97.	100.
49.	0.646	0.0036	0.55	-0.0599	51.68	46.69	4.99	0.521	0.0022	0.42	-0.0928	0.0015	2.38	0.99	95.	100.
48.	0.578	0.0040	0.68	-0.0697	50.45	45.85	4.59	0.446	0.0023	0.53	-0.1206	0.0020	2.83	0.99	97.	100.
47.	0.502	0.0036	0.71	-0.0801	49.28	45.02	4.25	0.366	0.0020	0.54	-0.1595	0.0023	2.97	0.99	97.	100.
46.	0.420	0.0026	0.61	-0.0850	48.06	44.12	3.94	0.287	0.0013	0.46	-0.2026	0.0021	2.54	0.99	96.	100.
45.	0.336	0.0019	0.57	-0.0813	46.90	43.25	3.65	0.220	0.0010	0.43	-0.2418	0.0021	2.31	1.00	97.	100.
44.	0.258	0.0014	0.54	-0.0740	45.78	42.37	3.41	0.162	0.0007	0.41	-0.2867	0.0021	2.23	1.00	97.	100.
43.	0.190	0.0010	0.53	-0.0620	44.65	41.47	3.18	0.116	0.0005	0.40	-0.3259	0.0022	2.49	1.00	95.	100.
42.	0.134	0.0009	0.66	-0.0492	43.55	40.58	2.97	0.080	0.0004	0.51	-0.3672	0.0030	3.09	1.00	95.	100.
41.	0.092	0.0008	0.89	-0.0366	42.43	39.67	2.76	0.054	0.0004	0.68	-0.3991	0.0042	4.25	0.99	94.	100.
40.	0.062	0.0008	1.27	-0.0242	41.33	38.77	2.55	0.038	0.0004	0.98	-0.3914	0.0066	5.62	0.99	94.	100.
39.	0.044	0.0008	1.85	-0.0146	40.21	37.84	2.37	0.030	0.0004	1.40	-0.3289	0.0103	7.75	0.96	97.	100.
38.	0.032	0.0007	2.17	-0.0097	39.10	36.91	2.19	0.023	0.0004	1.64	-0.3051	0.0129	9.07	0.92	98.	100.
37.	0.025	0.0007	2.87	-0.0061	38.04	36.00	2.04	0.019	0.0004	2.18	-0.2461	0.0184	12.61	0.81	97.	100.
36.	0.020	0.0009	4.33	-0.0032	37.08	35.00	2.08	0.017	0.0006	3.32	-0.1585	0.0271	21.45	0.50	103.	110.
35.	0.017	0.0008	5.06	-0.0022	36.08	33.97	2.11	0.014	0.0006	3.81	-0.1319	0.0313	25.79	0.37	115.	120.
34.	0.013	0.0007	5.25	-0.0031	35.10	32.98	2.12	0.010	0.0004	3.98	-0.2336	0.0326	27.96	0.54	125.	130.
33.	0.011	0.0006	5.52	-0.0006	34.09	31.98	2.11	0.011	0.0004	4.19	-0.0576	0.0339	31.39	0.15	135.	140.
32.	0.010	0.0005	4.84	-0.0004	33.07	30.97	2.10	0.010	0.0004	3.66	-0.0427	0.0300	30.85	0.12	143.	150.
31.	0.008	0.0005	6.67	-0.0034	32.08	29.99	2.09	0.005	0.0003	5.08	-0.4175	0.0410	49.58	0.64	152.	160.
30.	0.007	0.0006	8.11	0.0001	31.05	28.99	2.06	0.008	0.0005	6.06	0.0124	0.0508	58.44	-0.02	165.	170.
29.	0.008	0.0006	7.51	-0.0006	30.04	28.00	2.04	0.008	0.0004	5.67	-0.0765	0.0472	58.33	0.12	172.	180.
28.	0.007	0.0006	8.98	-0.0013	29.02	27.02	2.00	0.006	0.0004	6.81	-0.1820	0.0566	77.46	0.24	174.	190.
27.	0.006	0.0006	10.72	-0.0006	28.06	26.01	2.05	0.005	0.0004	8.07	-0.1129	0.0665	88.56	0.12	186.	210.
26.	0.005	0.0006	11.94	-0.0013	27.02	25.01	2.01	0.004	0.0003	9.02	-0.2719	0.0735	88.90	0.27	176.	220.
25.	0.004	0.0005	12.84	-0.0007	26.02	24.02	2.00	0.003	0.0003	9.70	-0.1678	0.0793	83.73	0.17	155.	230.
24.	0.004	0.0007	18.02	0.0003	25.01	23.00	2.01	0.004	0.0005	13.59	0.0766	0.1064	125.64	-0.06	128.	240.
23.	0.004	0.0006	16.34	-0.0005	24.07	21.99	2.08	0.003	0.0004	12.70	-0.1304	0.0920	145.19	0.13	114.	260.
22.	-0.003	0.0	0.0	0.0	23.08	21.01	2.07	0.0	0.0	0.0	0.0	0.0	-99.48	0.0	265.	280.
21.	-0.008	0.0	0.0	0.0	22.06	20.02	2.04	0.0	0.0	0.0	0.0	0.0	-99.38	0.0	282.	300.
20.	-0.013	0.0	0.0	0.0	21.07	19.06	2.01	0.0	0.0	0.0	0.0	0.0	-99.40	0.0	320.	330.
19.	-0.016	0.0	0.0	0.0	20.11	18.09	2.02	0.0	0.0	0.0	0.0	0.0	-99.43	0.0	367.	390.
18.	-0.019	0.0	0.0	0.0	19.09	17.09	2.00	0.0	0.0	0.0	0.0	0.0	-99.27	0.0	445.	470.

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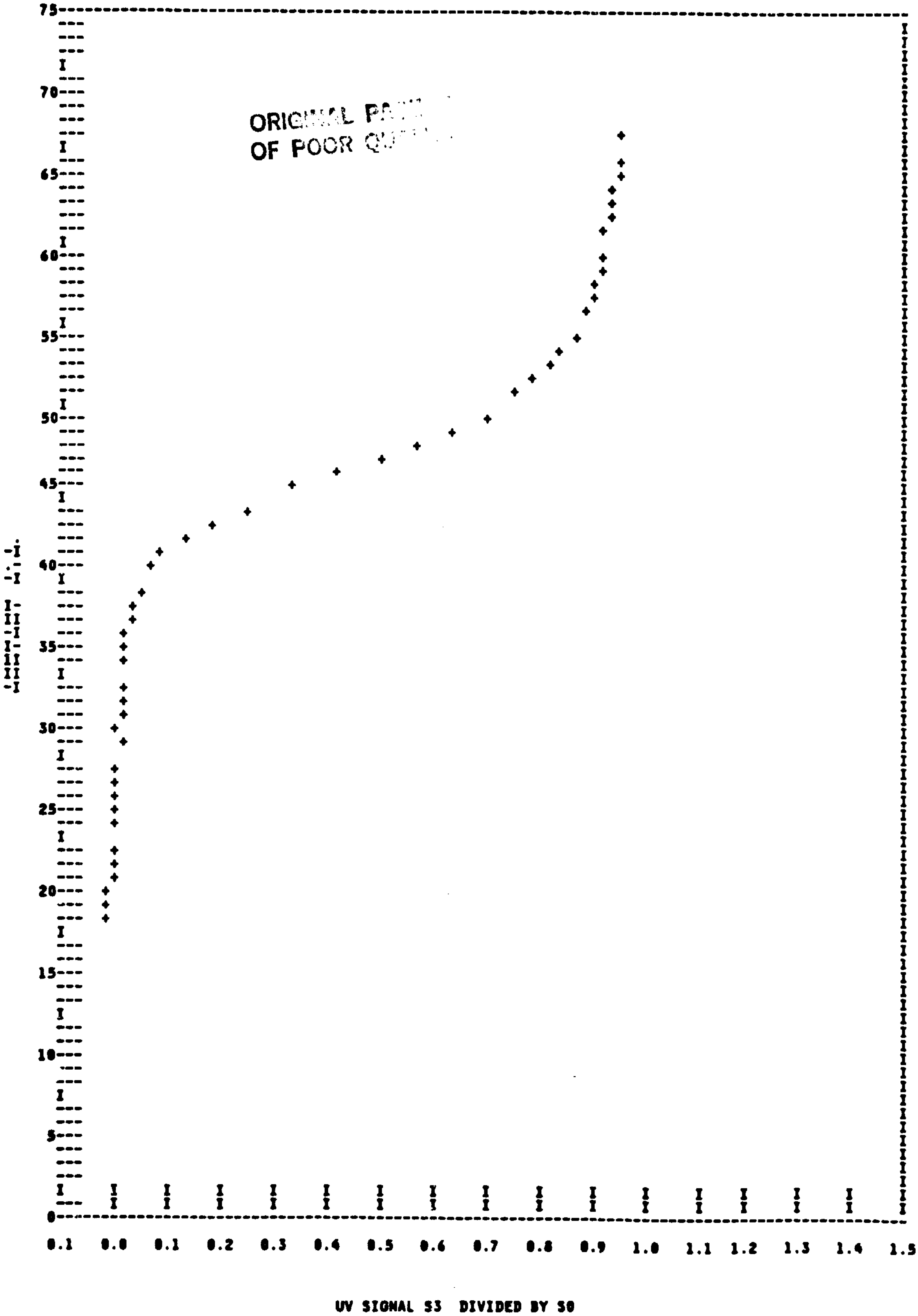
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UV SIGNAL S3 DIVIDED BY S0

PROFILE

325.0 KA2116 10 KA2113 10 0 0 83 BARR 0 489

OPT	TOP	BASE	CTR NM	BW NM	A0	A1	A2	BETA
3	58.0	39.0	265.30	13.30	194.8020	-3073.26978	-23416.39844	2.07930
2	49.0	30.0	292.30	9.10	32.7789	-72.54568	158.06099	1.36420
1	44.0	19.0	300.80	7.10	8.2503	-3.86985	2.06072	1.20600
0	40.0	19.0	306.70	6.80	3.1370	-0.50358	0.07242	1.10980
30	58.0	39.0	0.0	0.0	191.7250	-3072.76636	-23416.46875	0.96950
20	49.0	30.0	0.0	0.0	29.6419	-72.04211	157.98857	0.25440
10	44.0	19.0	0.0	0.0	5.1134	-3.36627	1.98830	0.09620

DATE	AM	PM	DOBSON UNITS
11 22 83	260.0	253.0	

FLT ID	MM/DD/YY	HHMM	DMN	BALT	BTMP	BMBAR	DATASONDE
T1-0771	11 22 83	1530	60	18.7	205.10	70.00	

FLT ID	MM/DD/YY	HHMM	ALT	ATM-CM	ECC SONDE
4A0326	11 22 83	15 0	22000.	0.09096	

FLT ID	MM/DD/YY	HHMM	ALT	ATM-CM	ECC SONDE
4A0327	11 22 83	1720	22000.	0.08950	

DSB = 18.666 KM 205.100 K 70.000 MBAR

MXSND = 51

NECC = 19 19

ECCLM AT	250	125	62.5 MBAR
	0.026	0.033	0.053
	0.0	0.0	0.0

SONDE =

	ALT	TEMP	PRESS	DENS	ERR K
1	70.090	234.450	0.049	0.7317E-04	11.476
2	69.000	232.550	0.057	0.8512E-04	10.183
3	68.000	232.450	0.066	0.9831E-04	9.175
4	67.000	236.250	0.076	0.1116E-03	8.259
5	66.000	240.050	0.087	0.1263E-03	7.495
6	65.000	244.250	0.100	0.1426E-03	6.879
7	64.000	247.050	0.115	0.1615E-03	6.249
8	63.000	249.350	0.131	0.1831E-03	5.812
9	62.000	251.250	0.150	0.2077E-03	5.457
10	61.000	253.450	0.171	0.2351E-03	5.177
11	60.000	252.950	0.195	0.2689E-03	4.964
12	59.000	255.150	0.223	0.3042E-03	5.177
13	58.000	258.750	0.254	0.3418E-03	4.752
14	57.000	261.750	0.289	0.3843E-03	4.674
15	56.000	256.450	0.329	0.4464E-03	4.604
16	55.000	255.350	0.375	0.5112E-03	4.563
17	54.000	256.650	0.427	0.5798E-03	4.563
18	53.000	256.350	0.487	0.6616E-03	4.563
19	52.000	256.450	0.555	0.7539E-03	3.608
20	51.000	257.450	0.633	0.8559E-03	3.608
21	50.000	256.750	0.721	0.9780E-03	3.608
22	49.000	255.450	0.822	0.1121E-02	3.608
23	48.000	254.050	0.938	0.1286E-02	3.584
24	47.000	252.950	1.071	0.1475E-02	3.584
25	46.000	252.550	1.223	0.1688E-02	3.561
26	45.000	252.950	1.398	0.1925E-02	3.561
27	44.000	251.350	1.597	0.2214E-02	3.539
28	43.000	249.350	1.827	0.2553E-02	3.539
29	42.000	249.850	2.091	0.2916E-02	3.539
30	41.000	246.650	2.395	0.3383E-02	3.519
31	40.000	242.250	2.749	0.3953E-02	3.519
32	39.000	240.050	3.162	0.4588E-02	3.519
33	38.000	237.250	3.642	0.5347E-02	3.499
34	37.000	236.650	4.199	0.6181E-02	3.499
35	36.000	234.650	4.845	0.7193E-02	3.481
36	35.000	231.650	5.600	0.8422E-02	3.481
37	34.000	232.350	6.477	0.9712E-02	3.465
38	33.000	230.550	7.495	0.1133E-01	3.465
39	32.000	228.150	8.685	0.1326E-01	3.450
40	31.000	227.650	10.073	0.1542E-01	3.450
41	30.000	226.250	11.692	0.1800E-01	3.436
42	29.000	224.550	13.584	0.2107E-01	3.436

43	28.000	220.450	15.815	0.2499E-01	3.436
44	27.000	218.550	18.451	0.2941E-01	3.436
45	26.000	216.850	21.556	0.3463E-01	3.436
46	25.000	213.950	25.225	0.4107E-01	3.436
47	24.000	213.350	29.559	0.4827E-01	3.436
48	23.000	211.150	34.675	0.5721E-01	3.436
49	22.000	210.950	40.716	0.6724E-01	3.436
50	21.000	209.650	47.839	0.7949E-01	3.436
51	20.000	208.950	56.254	0.9379E-01	3.436
52	0.0	0.0	0.0	0.0	0.0
53	0.0	0.0	0.0	0.0	0.0
54	0.0	0.0	0.0	0.0	0.0
55	0.0	0.0	0.0	0.0	0.0
56	0.0	0.0	0.0	0.0	0.0
57	0.0	0.0	0.0	0.0	0.0
58	0.0	0.0	0.0	0.0	0.0
59	0.0	0.0	0.0	0.0	0.0
60	0.0	0.0	0.0	0.0	0.0
61	0.0	0.0	0.0	0.0	0.0
62	0.0	0.0	0.0	0.0	0.0
63	0.0	0.0	0.0	0.0	0.0
64	0.0	0.0	0.0	0.0	0.0
65	0.0	0.0	0.0	0.0	0.0
66	0.0	0.0	0.0	0.0	0.0
67	0.0	0.0	0.0	0.0	0.0
68	0.0	0.0	0.0	0.0	0.0
69	0.0	0.0	0.0	0.0	0.0
70	0.0	0.0	0.0	0.0	0.0

ECC =

	(1) ALT	(1) TEMP	(1) PRESS	(1) O3		(2) ALT	(2) TEMP	(2) PRESS	(2) O3
1	0.167	289.000	1000.000	27.500	1	0.160	290.100	1000.000	17.700
2	1.532	283.500	850.000	38.600	2	1.530	285.400	850.000	35.900
3	3.121	273.100	700.000	26.000	3	3.126	274.300	700.000	26.700
4	5.758	259.400	500.000	21.100	4	5.768	259.300	500.000	20.400
5	7.415	247.000	400.000	17.100	5	7.422	247.200	400.000	17.300
6	9.439	233.200	300.000	17.500	6	9.447	232.500	300.000	15.200
7	10.661	225.200	250.000	19.000	7	10.670	226.000	250.000	22.700
8	12.128	221.700	200.000	11.100	8	12.134	221.900	200.000	9.900
9	13.963	213.800	150.000	10.300	9	13.966	213.000	150.000	8.600
10	16.458	208.000	100.000	21.200	10	16.438	207.400	100.000	19.200
11	18.607	205.100	70.000	66.300	11	18.594	208.400	70.000	80.500
12	19.543	208.900	60.000	98.400	12	19.539	211.300	60.000	89.700
13	20.669	212.100	50.000	114.500	13	20.667	211.100	50.000	110.500
14	22.056	212.900	40.000	134.600	14	22.043	211.900	40.000	127.000
15	23.858	216.400	30.000	145.100	15	23.855	216.600	30.000	132.500
16	25.013	216.400	25.000	130.400	16	25.023	219.900	25.000	116.600
17	26.440	220.000	20.000	110.200	17	26.465	220.900	20.000	85.300
18	28.308	222.500	15.000	84.100	18	28.373	227.200	15.000	66.700
19	31.008	230.600	10.000	61.060	19	31.111	233.800	10.000	41.100

STD =

	ALT	O3/M3	ATM-CM
1	70.0	0.540E 15	0.535E-05
2	69.0	0.645E 15	0.756E-05
3	68.0	0.750E 15	0.102E-04
4	67.0	0.123E 16	0.138E-04
5	66.0	0.172E 16	0.193E-04
6	65.0	0.244E 16	0.271E-04
7	64.0	0.317E 16	0.375E-04
8	63.0	0.399E 16	0.509E-04
9	62.0	0.481E 16	0.672E-04
10	61.0	0.607E 16	0.875E-04
11	60.0	0.733E 16	0.112E-03
12	59.0	0.926E 16	0.143E-03
13	58.0	0.112E 17	0.181E-03
14	57.0	0.136E 17	0.228E-03
15	56.0	0.161E 17	0.283E-03
16	55.0	0.208E 17	0.352E-03
17	54.0	0.255E 17	0.438E-03
18	53.0	0.319E 17	0.545E-03
19	52.0	0.384E 17	0.676E-03

20	51.0	0.524E 17	0.845E-03
21	50.0	0.664E 17	0.107E-02
22	49.0	0.847E 17	0.135E-02
23	48.0	0.103E 18	0.170E-02
24	47.0	0.136E 18	0.214E-02
25	46.0	0.169E 18	0.271E-02
26	45.0	0.221E 18	0.344E-02
27	44.0	0.274E 18	0.436E-02
28	43.0	0.336E 18	0.549E-02
29	42.0	0.398E 18	0.686E-02
30	41.0	0.502E 18	0.853E-02
31	40.0	0.607E 18	0.106E-01
32	39.0	0.740E 18	0.131E-01
33	38.0	0.873E 18	0.161E-01
34	37.0	0.105E 19	0.197E-01
35	36.0	0.122E 19	0.239E-01
36	35.0	0.140E 19	0.288E-01
37	34.0	0.158E 19	0.343E-01
38	33.0	0.180E 19	0.406E-01
39	32.0	0.203E 19	0.478E-01
40	31.0	0.227E 19	0.558E-01
41	30.0	0.252E 19	0.647E-01
42	29.0	0.288E 19	0.747E-01
43	28.0	0.324E 19	0.861E-01
44	27.0	0.363E 19	0.989E-01
45	26.0	0.403E 19	0.113
46	25.0	0.428E 19	0.129
47	24.0	0.454E 19	0.145
48	23.0	0.470E 19	0.162
49	22.0	0.486E 19	0.180
50	21.0	0.481E 19	0.198
51	20.0	0.477E 19	0.216
52	19.0	0.440E 19	0.233
53	18.0	0.404E 19	0.249
54	17.0	0.349E 19	0.263
55	16.0	0.295E 19	0.275
56	15.0	0.265E 19	0.285
57	14.0	0.235E 19	0.294
58	13.0	0.218E 19	0.303
59	12.0	0.202E 19	0.311
60	11.0	0.157E 19	0.317

ROCOZ FLIGHT NO. 323.0 FLOWN 112283.(MMDDYY.) 163000.0(HHMMSS.S)
AT 37.850 LAT, -75.480 LONG. ,WALLOPS ISLAND

ALT-KM	ERx	Z-HHMMSS.S	SZA-DEG	SZA-SEC	SLNT-ATM	SCAT CMPx	AIR T-K	ERR-K	AIR P-MBAR	INSTR TMP-C
57.	0.04	163330.3	57.95	1.8843	0.00054	0.018	261.75	4.67	0.288743	21.5
56.	0.04	163337.1	57.95	1.8842	0.00061	0.021	256.45	4.60	0.328643	21.5
55.	0.04	163344.2	57.94	1.8841	0.00070	0.024	255.35	4.56	0.374678	21.6
54.	0.04	163351.9	57.94	1.8840	0.00079	0.028	256.65	4.56	0.427156	21.7
53.	0.04	163400.2	57.94	1.8839	0.00091	0.032	256.35	4.56	0.486880	21.7
52.	0.04	163409.1	57.94	1.8837	0.00103	0.037	256.45	3.61	0.555006	21.8
51.	0.04	163418.8	57.93	1.8836	0.00118	0.042	257.45	3.61	0.632512	21.8
50.	0.04	163429.2	57.93	1.8834	0.00134	0.049	256.75	3.61	0.720816	21.9
49.	0.04	163440.5	57.93	1.8832	0.00153	0.057	255.45	3.61	0.821902	22.0
48.	0.04	163452.7	57.92	1.8831	0.00174	0.065	254.05	3.58	0.937853	22.0
47.	0.04	163505.7	57.92	1.8829	0.00199	0.075	252.95	3.58	1.070904	22.1
46.	0.04	163520.1	57.92	1.8828	0.00227	0.087	252.55	3.56	1.223363	22.1
45.	0.04	163535.4	57.92	1.8826	0.00260	0.101	252.95	3.56	1.397585	22.2
44.	0.05	163551.9	57.91	1.8825	0.00297	0.116	251.35	3.54	1.597190	22.2
43.	0.05	163609.6	57.91	1.8823	0.00340	0.134	249.35	3.54	1.827132	22.3
42.	0.05	163628.6	57.91	1.8821	0.00389	0.155	249.85	3.54	2.091111	22.3
41.	0.05	163649.1	57.90	1.8819	0.00445	0.179	246.65	3.52	2.395087	22.3
40.	0.05	163711.0	57.90	1.8817	0.00511	0.207	242.25	3.52	2.749164	22.3
39.	0.05	163734.9	57.89	1.8814	0.00587	0.239	240.05	3.52	3.161682	22.3
38.	0.05	163800.9	57.89	1.8811	0.00677	0.275	237.25	3.50	3.641590	22.3
37.	0.05	163828.6	57.88	1.8808	0.00780	0.318	236.65	3.50	4.198783	22.3
36.	0.06	163858.5	57.88	1.8806	0.00900	0.367	234.65	3.48	4.845252	22.3
35.	0.06	163931.1	57.87	1.8803	0.01040	0.424	231.65	3.48	5.600100	22.2
34.	0.06	164005.7	57.87	1.8801	0.01203	0.490	232.35	3.46	6.477487	22.1
33.	0.06	164043.6	57.86	1.8799	0.01392	0.565	230.55	3.46	7.495271	22.1
32.	0.06	164124.6	57.86	1.8796	0.01612	0.653	228.15	3.45	8.684[illegible]72	21.9
31.	0.06	164209.0	57.85	1.8794	0.01870	0.754	227.65	3.45	10.073415	21.7
30.	0.07	164257.3	57.85	1.8793	0.02170	0.870	226.25	3.44	11.691624	21.4
29.	0.07	164349.6	57.85	1.8792	0.02521	1.005	224.55	3.44	13.584329	21.1
28.	0.07	164445.9	57.85	1.8790	0.02935	1.160	220.45	3.44	15.815084	20.8
27.	0.07	164547.3	57.84	1.8789	0.03424	1.340	218.55	3.44	18.451355	20.2
26.	0.08	164655.3	57.84	1.8789	0.04000	1.547	216.85	3.44	21.555588	19.7
25.	0.08	164809.1	57.85	1.8790	0.04681	1.787	213.95	3.44	25.225159	18.9
24.	0.08	164929.5	57.85	1.8790	0.05485	2.064	213.35	3.44	29.558929	18.2
23.	0.09	165057.1	57.85	1.8792	0.06436	2.383	211.15	3.44	34.675232	17.2
22.	0.09	165235.3	57.85	1.8793	0.07557	2.752	210.95	3.44	40.716080	16.0
21.	0.10	165425.0	57.86	1.8796	0.08880	3.178	209.65	3.44	47.839127	14.4
20.	0.10	165628.1	57.87	1.8803	0.10447	3.672	208.95	3.44	56.254471	12.9

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DATA FOR FILTER POSITION S3

ALT	INTENSITY	DLI/DH	NOISE	SLNTO	SLNTA	ALPHA-F	BET-F	DA/DSLO	DSLA/DH	O3TAU	AIRTAU	COMP	SCAT%	B(SMTH)	BSTDV	BDH
57.	725.3967	-0.0132	0.0035	.00041	.00054	193.600	1.607	510.5198	0.0001	0.079	0.001	456.	0.018	-0.0116	0.0004	11.48
56.	714.4473	-0.0168	0.0038	.00050	.00061	193.332	1.607	539.3660	0.0001	0.096	0.001	462.	0.021	-0.0160	0.0004	10.87
55.	701.3755	-0.0213	0.0045	.00061	.00070	192.993	1.607	560.8982	0.0001	0.117	0.001	466.	0.024	-0.0194	0.0005	10.10
54.	684.6624	-0.0285	0.0049	.00075	.00079	192.536	1.607	606.8872	0.0001	0.145	0.001	462.	0.028	-0.0250	0.0007	9.54
53.	662.5422	-0.0348	0.0054	.00093	.00091	191.974	1.607	602.0447	0.0001	0.179	0.001	483.	0.032	-0.0341	0.0009	8.96
52.	638.6157	-0.0449	0.0064	.00117	.00103	191.245	1.607	625.6636	0.0001	0.223	0.002	493.	0.037	-0.0428	0.0009	8.38
51.	605.6362	-0.0578	0.0062	.00147	.00118	190.295	1.607	646.5625	0.0002	0.279	0.002	489.	0.042	-0.0568	0.0012	7.91
50.	568.9036	-0.0755	0.0081	.00187	.00134	189.038	1.607	673.2244	0.0002	0.353	0.002	485.	0.049	-0.0721	0.0012	7.46
49.	520.7173	-0.0993	0.0081	.00240	.00153	187.358	1.607	701.5862	0.0002	0.449	0.002	474.	0.057	-0.0937	0.0018	7.10
48.	466.4136	-0.1286	0.0094	.00309	.00174	185.134	1.607	720.0757	0.0002	0.572	0.003	474.	0.065	-0.1258	0.0020	6.65
47.	402.6611	-0.1656	0.0090	.00399	.00199	182.187	1.607	737.9478	0.0003	0.728	0.003	456.	0.075	-0.1659	0.0023	6.32
46.	334.9209	-0.2028	0.0086	.00513	.00227	178.444	1.607	729.8625	0.0003	0.915	0.004	464	0.087	-0.2054	0.0021	6.02
45.	268.3982	-0.2460	0.0089	.00654	.00260	173.692	1.607	726.5845	0.0004	1.136	0.004	484.	0.101	-0.2435	0.0019	5.69
44.	204.7740	-0.2912	0.0075	.00827	.00297	167.736	1.607	720.1084	0.0004	1.387	0.005	495.	0.116	-0.2922	0.0026	5.43
43.	149.9281	-0.3353	0.0085	.01036	.00340	160.370	1.607	711.1282	0.0005	1.661	0.005	480.	0.134	-0.3349	0.0023	5.19
42.	104.7249	-0.3738	0.0095	.01282	.00389	151.410	1.607	699.0559	0.0005	1.941	0.006	479.	0.155	-0.3756	0.0025	4.99
41.	70.9960	-0.3963	0.0130	.01562	.00445	140.859	1.607	675.3992	0.0006	2.200	0.007	473.	0.179	-0.4076	0.0038	4.78
40.	47.4087	-9.3773	0.0191	.01852	.00511	129.584	1.607	608.8564	0.0007	2.400	0.008	501.	0.207	-0.4006	0.0061	4.58

DATA FOR FILTER POSITION S3

ALT	HHMMSS.S	O3ATM-CM/KM	NUM/M3	ERR%	COL-ATM-CM	NUM/M2	AIR-T-K	ER%	AIR-P-MBAR	ER%	AIR-N/M3	AIR-COL-ATM	O3-NANOBAR	PPMV
57.	163330.3	0.000036	0.9634E 16	26.7	0.000217	0.5837E 20	261.75	1.8	0.28874	2.3	0.7990E 22	0.000285	0.34815	1.21
56.	163337.1	0.000046	0.1232E 17	22.7	0.000263	0.7070E 20	256.45	1.8	0.32864	2.3	0.9282E 22	0.000325	0.43629	1.33
55.	163344.2	0.000058	0.1562E 17	21.1	0.000321	0.8633E 20	255.35	1.8	0.37468	2.3	0.1063E 23	0.000370	0.55075	1.47
54.	163351.9	0.000078	0.2097E 17	17.4	0.000399	0.1073E 21	256.65	1.8	0.42716	2.3	0.1206E 23	0.000422	0.74302	1.74
53.	163400.2	0.000096	0.2572E 17	15.5	0.000495	0.1330E 21	256.35	1.8	0.48688	2.3	0.1376E 23	0.000481	0.91023	1.87
52.	163409.1	0.000124	0.3332E 17	14.2	0.000619	0.1664E 21	256.45	1.4	0.55501	2.0	0.1568E 23	0.000548	1.17987	2.13
51.	163418.8	0.000161	0.4314E 17	10.7	0.000780	0.2095E 21	257.45	1.4	0.63251	2.0	0.1780E 23	0.000625	1.53322	2.42
50.	163429.2	0.000211	0.5679E 17	10.7	0.000991	0.2663E 21	256.75	1.4	0.72082	2.0	0.2033E 23	0.000712	2.01294	2.79
49.	163440.5	0.000281	0.7538E 17	8.1	0.001272	0.3417E 21	255.45	1.4	0.82190	2.0	0.2330E 23	0.000812	2.65845	3.23
48.	163452.7	0.000368	0.9878E 17	7.4	0.001640	0.4405E 21	254.05	1.4	0.93785	2.0	0.2674E 23	0.000926	3.46482	3.69
47.	163505.7	0.000481	0.1293E 18	5.5	0.002121	0.5699E 21	252.95	1.4	1.07090	2.0	0.3066E 23	0.001058	4.51722	4.22
46.	163520.1	0.000602	0.1618E 18	4.3	0.002723	0.7317E 21	252.55	1.4	1.22336	2.0	0.3509E 23	0.001208	5.64094	4.61
45.	163535.4	0.000750	0.2016E 18	3.7	0.003474	0.9334E 21	252.95	1.4	1.39758	2.0	0.4002E 23	0.001380	7.04142	5.04
44.	163551.9	0.000920	0.2471E 18	2.7	0.004394	0.1181E 22	251.35	1.4	1.59719	2.0	0.4603E 23	0.001577	8.57591	5.37
43.	163609.6	0.001108	0.2976E 18	2.6	0.005502	0.1478E 22	249.35	1.4	1.82713	2.0	0.5307E 23	0.001805	10.24606	5.61
42.	163628.6	0.001308	0.3513E 18	2.6	0.006810	0.1830E 22	249.85	1.4	2.09111	2.0	0.6062E 23	0.002065	12.11948	5.80
41.	163649.1	0.001489	0.4002E 18	3.3	0.008301	0.2230E 22	246.65	1.4	2.39509	2.0	0.7033E 23	0.002365	13.62753	5.69
40.	163711.0	0.001540	0.4139E 18	5.1	0.009842	0.2644E 22	242.25	1.5	2.74916	2.0	0.8220E 23	0.002715	13.84207	5.04

DATA FOR FILTER POSITION S3 DIVIDED BY S0

ALT	INTENSITY	DLI/DH	NOISE	SLNTO	SLNTA	ALPHA-F	BET-F	DA/DSLO	DSLA/DH	O3TAU	AIRTAU	COMP	SCATX	B(SMTH)	BSTDV	BDH
57.	0.8997	-0.0138	0.0042	.00041	.00054	190.448	0.969	539.8450	0.0001	0.079	0.001	456.	0.018	-0.0122	0.0005	11.48
56.	0.8858	-0.0183	0.0046	.00051	.00061	190.157	0.969	572.8806	0.0001	0.097	0.001	462.	0.021	-0.0159	0.0006	10.87
55.	0.8679	-0.0226	0.0049	.00063	.00070	189.790	0.969	586.3540	0.0001	0.119	0.001	466.	0.024	-0.0206	0.0006	10.19
54.	0.8467	-0.0278	0.0052	.00077	.00079	189.335	0.969	588.0986	0.0001	0.146	0.001	462.	0.028	-0.0264	0.0007	9.54
53.	0.8209	-0.0355	0.0056	.00096	.00091	188.752	0.969	607.2244	0.0001	0.181	0.001	483.	0.032	-0.0346	0.0008	8.96
52.	0.7887	-0.0460	0.0060	.00120	.00103	187.989	0.969	633.3889	0.0001	0.226	0.001	493.	0.037	-0.0432	0.0009	8.38
51.	0.7487	-0.0589	0.0062	.00151	.00118	187.016	0.969	642.2517	0.0002	0.283	0.001	489.	0.042	-0.0566	0.0011	7.91
50.	0.7023	-0.0738	0.0072	.00191	.00134	185.763	0.969	655.5845	0.0002	0.355	0.001	485.	0.049	-0.0710	0.0012	7.46
49.	0.6459	-0.0972	0.0082	.00244	.00153	184.087	0.969	687.8413	0.0002	0.449	0.001	474.	0.057	-0.0928	0.0015	7.10
48.	0.5782	-0.1260	0.0090	.00313	.00174	181.865	0.969	709.8940	0.0002	0.569	0.002	474.	0.065	-0.1206	0.0020	6.65
47.	0.5021	-0.1603	0.0091	.00402	.00199	178.957	0.969	722.9292	0.0003	0.720	0.002	456.	0.075	-0.1595	0.0023	6.32
46.	0.4196	-0.2002	0.0091	.00516	.00227	175.188	0.969	729.7380	0.0003	0.905	0.002	464.	0.087	-0.2026	0.0021	6.02
45.	0.3364	-0.2431	0.0081	.00659	.00260	170.393	0.969	727.6875	0.0004	1.123	0.003	484.	0.101	-0.2418	0.0021	5.69
44.	0.2580	-0.2849	0.0077	.00832	.00297	164.439	0.969	715.6538	0.0004	1.368	0.003	495.	0.116	-0.2867	0.0021	5.43
43.	0.1903	-0.3276	0.0085	.01040	.00340	157.084	0.969	707.2397	0.0005	1.634	0.003	480.	0.134	-0.3259	0.0022	5.19
42.	0.1340	-0.3646	0.0103	.01294	.00389	148.140	0.969	695.6909	0.0005	1.905	0.004	479.	0.155	-0.3672	0.0030	4.99
41.	0.0918	-0.3869	0.0142	.01566	.00445	137.579	0.969	674.3257	0.0006	2.155	0.004	473.	0.179	-0.3991	0.0042	4.78
40.	0.0618	-0.3645	0.0203	.01853	.00511	126.398	0.969	603.2217	0.0007	2.343	0.005	501.	0.207	-0.3914	0.0066	4.58

DATA FOR FILTER POSITION S3 DIVIDED BY S0

ALT	HHMMSS.S	O3ATM-CM/KM	NUM/M3	ERRX	COL-ATM-CM	NUM/M2	AIR-T-K	ERX	AIR-P-MBAR	ERX	AIR-N/M3	AIR-COL-ATM	O3-NANOBAR	PPMV
57.	163330.3	0.000038	0.1031E 17	30.1	0.000220	0.5905E 20	261.75	1.8	0.28874	2.3	0.7990E 22	0.000285	0.37243	1.29
56.	163337.1	0.000050	0.1342E 17	25.5	0.000270	0.7247E 20	256.45	1.8	0.32864	2.3	0.9282E 22	0.000325	0.47510	1.45
55.	163344.2	0.000063	0.1691E 17	21.8	0.000333	0.8938E 20	255.35	1.8	0.37468	2.3	0.1063E 23	0.000370	0.59603	1.59
54.	163351.9	0.000078	0.2087E 17	18.8	0.000410	0.1103E 21	256.65	1.8	0.42716	2.3	0.1206E 23	0.000422	0.73966	1.73
53.	163400.2	0.000099	0.2671E 17	15.8	0.000510	0.1370E 21	256.35	1.8	0.48688	2.3	0.1376E 23	0.000481	0.94523	1.94
52.	163409.1	0.000130	0.3483E 17	13.0	0.000639	0.1718E 21	256.45	1.4	0.55501	2.0	0.1568E 23	0.000548	1.23312	2.22
51.	163418.8	0.000164	0.4415E 17	10.7	0.000804	0.2160E 21	257.45	1.4	0.63251	2.0	0.1780E 23	0.000625	1.56927	2.48
50.	163429.2	0.000211	0.5657E 17	9.8	0.001014	0.2726E 21	256.75	1.4	0.72082	2.0	0.2033E 23	0.000712	2.00530	2.78
49.	163440.5	0.000280	0.7518E 17	8.4	0.001294	0.3478E 21	255.45	1.4	0.82190	2.0	0.2330E 23	0.000812	2.65133	3.23
48.	163452.7	0.000367	0.9865E 17	7.2	0.001662	0.4465E 21	254.05	1.4	0.93785	2.0	0.2674E 23	0.000926	3.46028	3.69
47.	163505.7	0.000475	0.1276E 18	5.7	0.002137	0.5741E 21	252.95	1.4	1.07090	2.0	0.3066E 23	0.001058	4.45684	4.16
46.	163520.1	0.000606	0.1628E 18	4.6	0.002743	0.7370E 21	252.55	1.4	1.22336	2.0	0.3509E 23	0.001208	5.67799	4.64
45.	163535.4	0.000757	0.2033E 18	3.4	0.003500	0.9404E 21	252.95	1.4	1.39758	2.0	0.4002E 23	0.001380	7.10081	5.08
44.	163551.9	0.000919	0.2469E 18	2.8	0.004419	0.1187E 22	251.35	1.4	1.59719	2.0	0.4603E 23	0.001577	8.56778	5.36
43.	163609.6	0.001106	0.2971E 18	2.7	0.005525	0.1485E 22	249.35	1.4	1.82713	2.0	0.5307E 23	0.001805	10.22894	5.60
42.	163628.6	0.001305	0.3506E 18	2.9	0.006831	0.1835E 22	249.85	1.4	2.09111	2.0	0.6062E 23	0.002065	12.09317	5.78
41.	163649.1	0.001490	0.4004E 18	3.7	0.008322	0.2236E 22	246.65	1.4	2.39509	2.0	0.7033E 23	0.002365	13.63577	5.69
40.	163711.0	0.001527	0.4104E 18	5.6	0.009850	0.2647E 22	242.25	1.5	2.74916	2.0	0.8220E 23	0.002715	13.72491	4.99

OVERLAP ANALYSIS , WITH WEIGHTING MODE = 1 FILT Y = A + B * FILT X

FILT X	FILT Y	MX ALT	MN ALT	PAIRS	A	STD DEV A	B	STD DEV B	CORREL
S3	S2	48.	40.	9.	-0.2235E-03	0.37E-04	1.3932	0.03875	0.9844
S3	S1	43.	41.	3.	-0.3357E-03	0.93E-03	1.4462	0.70337	0.9992
S3	S3/0	48.	40.	9.	0.9177E-06	0.27E-04	0.9986	0.03172	0.9999
S3	S2/0	48.	41.	8.	-0.1574E-03	0.37E-04	1.2806	0.04078	0.9948
S3	S1/0	43.	41.	3.	-0.4990E-03	0.59E-03	1.6253	0.44732	0.9981
S2	S1	43.	31.	13.	-0.1528E-03	0.11E-03	1.1053	0.02268	0.9982
S2	S0	39.	31.	9.	-0.3809E-03	0.39E-03	1.1616	0.07649	0.9774
S2	S3/0	48.	41.	8.	0.1053E-03	0.24E-04	0.8147	0.02711	0.9938
S2	S2/0	48.	31.	18.	0.1041E-04	0.20E-04	0.9917	0.00977	0.9998
S2	S1/0	43.	31.	13.	-0.1757E-04	0.77E-04	1.0717	0.01782	0.9999
S1	S0	39.	20.	20.	-0.5426E-03	0.15E-03	1.1056	0.01497	0.9971
S1	S3/0	43.	41.	3.	0.2102E-03	0.16E-03	0.7057	0.10761	0.9994
S1	S2/0	43.	31.	13.	0.1284E-03	0.40E-04	0.9047	0.01383	0.9979
S1	S1/0	43.	20.	24.	0.2236E-03	0.50E-04	0.9500	0.00715	0.9991
S0	S2/0	39.	31.	9.	0.2341E-03	0.90E-04	0.8752	0.02361	0.9786
S0	S1/0	39.	20.	20.	0.6523E-03	0.62E-04	0.8683	0.00789	0.9935
S3/0	S2/0	48.	41.	8.	-0.1571E-03	0.37E-04	1.2805	0.04078	0.9946
S3/0	S1/0	43.	41.	3.	-0.4825E-03	0.59E-03	1.6140	0.44405	0.9985
S2/0	S1/0	43.	31.	13.	-0.6517E-04	0.78E-04	1.0926	0.01817	0.9998

MODE 1 IS INSTRUMENTAL WEIGHTING, THAT IS, 1/SIGMAY**2

ORIGINAL

OF POOR

COMPARISON OF COMPOSITE PROFILE WITH KRUGMINZ MODEL

ALT-KM	COMP O3 /M3	COMP ERR %	MODL O3 /M3	COMP-MODL %	COMP COL ATM-CM	COMP ERR %	MODEL COL	COMP-MODL ATM-CM	%
57.	0.9634E 16	26.7	0.1365E 17	-41.69	0.0001607	30.63	0.0002276	-0.0000678	-41.69
56.	0.1232E 17	22.7	0.1610E 17	-30.65	0.0002015	24.67	0.0002830	-0.0000815	-40.43
55.	0.1562E 17	21.1	0.2080E 17	-33.14	0.0002535	19.87	0.0003517	-0.0000981	-38.71
54.	0.2097E 17	17.4	0.2550E 17	-21.61	0.0003216	15.92	0.0004378	-0.0001162	-36.13
53.	0.2572E 17	15.5	0.3195E 17	-24.23	0.0004085	12.77	0.0005447	-0.0001362	-33.35
52.	0.3332E 17	14.2	0.3840E 17	-15.23	0.0005184	10.31	0.0006757	-0.0001573	-30.34
51.	0.4314E 17	10.7	0.5240E 17	-21.48	0.0006607	8.30	0.0008446	-0.0001840	-27.85
50.	0.5679E 17	10.7	0.6640E 17	-16.93	0.0008466	6.69	0.0010657	-0.0002191	-25.88
49.	0.7538E 17	8.1	0.8470E 17	-12.37	0.0010926	5.39	0.0013469	-0.0002543	-23.28
48.	0.9843E 17	4.6	0.1030E 18	-4.65	0.0014160	4.28	0.0016962	-0.0002802	-19.79
47.	0.1310E 18	3.2	0.1360E 18	-3.78	0.0018430	3.34	0.0021409	-0.0002979	-16.16
46.	0.1614E 18	2.5	0.1690E 18	-4.69	0.0023873	2.62	0.0027085	-0.0003212	-13.45
45.	0.2007E 18	2.5	0.2215E 18	-10.37	0.0030612	2.08	0.0034352	-0.0003740	-12.22
44.	0.2515E 18	1.7	0.2740E 18	-8.93	0.0039028	1.66	0.0043573	-0.0004545	-11.65
43.	0.3118E 18	1.5	0.3360E 18	-7.75	0.0049512	1.33	0.0054925	-0.0005413	-10.93
42.	0.3756E 18	1.4	0.3980E 18	-5.96	0.0062305	1.08	0.0068584	-0.0006279	-10.08
41.	0.4543E 18	1.3	0.5025E 18	-10.62	0.0077748	0.89	0.0085341	-0.0007593	-9.77
40.	0.5446E 18	1.4	0.6070E 18	-11.46	0.0096336	0.74	0.0105988	-0.0009652	-10.02
39.	0.7097E 18	1.3	0.7400E 18	-4.27	0.0119677	0.62	0.0131055	-0.0011378	-9.51
38.	0.8127E 18	1.1	0.8730E 18	-7.42	0.0148008	0.53	0.0161071	-0.0013064	-8.83
37.	0.9370E 18	1.2	0.1046E 19	-11.69	0.0180568	0.46	0.0196792	-0.0016224	-8.99
36.	0.1053E 19	1.0	0.1220E 19	-15.91	0.0217591	0.40	0.0238970	-0.0021378	-9.83
35.	0.1185E 19	1.1	0.1400E 19	-18.18	0.0259224	0.36	0.0287726	-0.0028501	-10.99
34.	0.1376E 19	0.8	0.1580E 19	-14.82	0.0306877	0.32	0.0343181	-0.0036304	-11.83
33.	0.1582E 19	0.7	0.1805E 19	-14.08	0.0361928	0.28	0.0406173	-0.0044245	-12.22
32.	0.1701E 19	0.7	0.2030E 19	-19.36	0.0423020	0.25	0.0477539	-0.0054520	-12.89
31.	0.1773E 19	0.7	0.2275E 19	-28.34	0.0487656	0.23	0.0557652	-0.0069996	-14.35
30.	0.1978E 19	1.2	0.2520E 19	-27.39	0.0557455	0.22	0.0646883	-0.0089427	-16.04
29.	0.2283E 19	0.8	0.2880E 19	-26.14	0.0636755	0.21	0.0747372	-0.0110617	-17.37
28.	0.2533E 19	1.1	0.3240E 19	-27.90	0.0726385	0.20	0.0861260	-0.0134875	-18.57
27.	0.2811E 19	0.7	0.3635E 19	-29.30	0.0825842	0.19	0.0989197	-0.0163355	-19.78
26.	0.3186E 19	0.8	0.4030E 19	-26.50	0.0937444	0.18	0.1131837	-0.0194393	-20.74
25.	0.3543E 19	0.6	0.4285E 19	-20.94	0.1062663	0.17	0.1286572	-0.0223909	-21.07
24.	0.3878E 19	0.6	0.4540E 19	-17.08	0.1200756	0.16	0.1450798	-0.0250042	-20.82
23.	0.3976E 19	0.6	0.4700E 19	-18.22	0.1346897	0.15	0.1622747	-0.0275850	-20.48
22.	0.3757E 19	0.6	0.4860E 19	-29.35	0.1490800	0.14	0.1800650	-0.0309851	-20.78
21.	0.3270E 19	0.8	0.4815E 19	-47.27	0.1621564	0.14	0.1980694	-0.0359130	-22.15
20.	0.2766E 19	1.0	0.4770E 19	-72.46	0.1733879	0.13	0.2159063	-0.0425184	-24.52

COMPARE ROCOZ + ECC COLUMN CONTENT WITH DOBSON TOTAL

	ATM-CM	ERROR	
ROCOZ 22.+ KM	0.14908	0.00021	
ECC 0-22. KM	0.09096	0.00910	
TOTAL	0.24004	0.00910	
DOBSON	0.26000	0.01820	
ROCOZ+ECC-DOBSON	-0.01996	0.02035	OR -7.98 PERCENT

CHECKS 2170: COMPENSATION CHANNEL FOR SZA=0, BASED ON DATA 50 - 35 KM, IS 897.0+,- 6.0 COUNTS.

ALTITUDE	OBS.COMP	COS SZA	COMP(SZA=0)
50.	484.66	0.531	912.80
49.	474.12	0.531	892.89
48.	473.57	0.531	891.77
47.	455.65	0.531	857.94
46.	464.49	0.531	874.52
45.	483.74	0.531	910.70
44.	495.29	0.531	932.36
43.	480.27	0.531	904.00
42.	479.36	0.531	902.21
41.	472.97	0.531	890.07
40.	500.73	0.531	942.21
39.	473.77	0.532	891.35
38.	488.44	0.532	918.82
37.	478.56	0.532	900.09
36.	458.58	0.532	862.39
35.	461.82	0.532	868.36

CHECKS 2190:

ALTITUDE	COS SZA	1-SCATTRD	CORR FACTR	PRED COMP	OBS COMP	PR-OB/PR %
57.	0.531	0.00009	0.5306	476.	456.	4.26
56.	0.531	0.00011	0.5307	476.	462.	2.89
55.	0.531	0.00013	0.5307	476.	466.	2.05
54.	0.531	0.00015	0.5307	476.	462.	3.05
53.	0.531	0.00017	0.5307	476.	483.	-1.41
52.	0.531	0.00019	0.5308	476.	493.	-3.49
51.	0.531	0.00022	0.5308	476.	489.	-2.63
50.	0.531	0.00026	0.5308	476.	485.	-1.78
49.	0.531	0.00030	0.5308	476.	474.	0.43
48.	0.531	0.00035	0.5309	476.	474.	0.55
47.	0.531	0.00040	0.5309	476.	456.	4.32
46.	0.531	0.00046	0.5309	476.	464.	2.46
45.	0.531	0.00053	0.5309	476.	484.	-1.58
44.	0.531	0.00062	0.5309	476.	495.	-4.00
43.	0.531	0.00071	0.5309	476.	480.	-0.85
42.	0.531	0.00082	0.5309	476.	479.	-0.66
41.	0.531	0.00095	0.5309	476.	473.	0.68
40.	0.531	0.00110	0.5309	476.	501.	-5.15
39.	0.532	0.00127	0.5308	476.	474.	0.51
38.	0.532	0.00146	0.5308	476.	488.	-2.58
37.	0.532	0.00169	0.5308	476.	479.	-0.51
36.	0.532	0.00195	0.5307	476.	459.	3.67
35.	0.532	0.00225	0.5306	476.	462.	2.98
34.	0.532	0.00260	0.5305	476.	483.	-1.42
33.	0.532	0.00301	0.5304	476.	497.	-4.53
32.	0.532	0.00347	0.5302	476.	476.	-0.05
31.	0.532	0.00401	0.5299	475.	481.	-1.23
30.	0.532	0.00463	0.5296	475.	496.	-4.49
29.	0.532	0.00535	0.5293	475.	488.	-2.78
28.	0.532	0.00618	0.5289	474.	485.	-2.17
27.	0.532	0.00714	0.5284	474.	479.	-1.08
26.	0.532	0.00824	0.5278	473.	483.	-2.09
25.	0.532	0.00952	0.5271	473.	495.	-4.74
24.	0.532	0.01099	0.5263	472.	464.	1.80
23.	0.532	0.01269	0.5254	471.	496.	-5.22
22.	0.532	0.01465	0.5243	470.	467.	0.70
21.	0.532	0.01691	0.5230	469.	474.	-1.02
20.	0.532	0.01952	0.5214	468.	480.	-2.53

CHECKS 2210:

CHECK OF DRAG COEFFICIENT VS ALTITUDE

ALTITUDE	VELOCITY	ACCELER	AIR DENS	DRAG C	REYNOLDS NO.
55.	134.98	-1.2638	0.511E-03	0.513	9050.
54.	125.23	-1.1941	0.580E-03	0.529	9486.
53.	115.91	-1.0449	0.662E-03	0.551	10028.
52.	107.20	-0.8708	0.754E-03	0.576	10565.
51.	99.66	-0.7357	0.856E-03	0.596	11116.
50.	92.44	-0.6782	0.978E-03	0.611	11807.
49.	84.99	-0.5558	0.112E-02	0.639	12492.
48.	79.36	-0.4746	0.129E-02	0.644	13442.
47.	73.03	-0.4455	0.147E-02	0.665	14236.
46.	67.16	-0.3411	0.169E-02	0.695	14998.
45.	62.87	-0.2719	0.192E-02	0.700	15995.
44.	58.51	-0.2444	0.221E-02	0.705	17206.
43.	54.52	-0.2141	0.255E-02	0.707	18608.
42.	50.66	-0.1869	0.292E-02	0.719	19715.
41.	47.14	-0.1635	0.338E-02	0.717	21510.
40.	43.72	-0.1543	0.395E-02	0.714	23657.
39.	40.08	-0.1293	0.459E-02	0.734	25360.
38.	37.27	-0.0998	0.535E-02	0.731	27743.
37.	34.73	-0.0919	0.618E-02	0.729	29944.
36.	31.97	-0.0794	0.719E-02	0.739	32311.
35.	29.76	-0.0656	0.842E-02	0.730	35583.
34.	27.57	-0.0607	0.971E-02	0.738	37918.
33.	25.36	-0.0524	0.113E-01	0.749	40934.
32.	23.43	-0.0443	0.133E-01	0.749	44677.
31.	21.58	-0.0383	0.154E-01	0.76[illegible]	47907.
30.	19.88	-0.0314	0.180E-01	0.768	51817.
29.	18.42	-0.0267	0.211E-01	0.765	56547.
28.	16.99	-0.0252	0.250E-01	0.758	62794.
27.	15.45	-0.0223	0.294E-01	0.779	67710.
26.	14.10	-0.0175	0.346E-01	0.795	73239.
25.	12.97	-0.0142	0.411E-01	0.793	80782.
24.	11.91	-0.0131	0.483E-01	0.800	87378.
23.	10.76	-0.0123	0.572E-01	0.826	94440.
22.	9.62	-0.0104	0.672E-01	0.880	99269.

ROCOZ FLIGHT NO. 325.0 FLOWN 112283.(MMDDYY.) 163000.0(HHMMSS.S)
AT 37.850 LAT, -75.480 LONG. ,WALLOPS ISLAND

OZONE PROFILE BASED ON ALL AVAILABLE ROCOZ DATA

ALT	ATM-CM/KM	O3 NUM/M3	ERRX	COL ATM-CM	ERRX	AIR T K	ERRX	AIR P MBAR	ERRX	O3 NANOBAR	ERRX	PPMV	ERRX	HHMMSS.S	SECNDS	FL	SZA
57.	0.3586E-04	2.9634E 16	26.7	0.000161	30.6	261.7	1.8	0.2887	3.2	0.348	26.8	1.21	27.0	163330.3	2010.	1.	57.95
56.	0.4586E-04	0.1232E 17	22.7	0.000202	24.7	256.4	1.8	0.3286	3.2	0.436	22.8	1.33	23.0	163337.1	2017.	1.	57.95
55.	0.5814E-04	0.1562E 17	21.1	0.000254	19.9	255.3	1.8	0.3747	3.2	0.551	21.2	1.47	21.4	163344.2	2024.	1.	57.94
54.	0.7804E-04	0.2097E 17	17.4	0.000322	15.9	256.6	1.8	0.4272	3.2	0.743	17.5	1.74	17.8	163351.9	2032.	1.	57.94
53.	0.9572E-04	0.2572E 17	15.5	0.000409	12.8	256.3	1.8	0.4869	3.2	0.910	15.6	1.87	15.9	163400.2	2040.	1.	57.94
52.	0.1240E-03	0.3332E 17	14.2	0.000518	10.3	256.4	1.4	0.5550	2.8	1.180	14.3	2.13	14.6	163409.1	2049.	1.	57.94
51.	0.1605E-03	0.4314E 17	10.7	0.000661	8.3	257.4	1.4	0.6325	2.8	1.533	10.8	2.42	11.1	163418.8	2059.	1.	57.93
50.	0.2114E-03	0.5679E 17	10.7	0.000847	6.7	256.7	1.4	0.7208	2.8	2.013	10.8	2.79	11.2	163429.2	2069.	1.	57.93
49.	0.2805E-03	0.7538E 17	8.1	0.001093	5.4	255.4	1.4	0.8219	2.8	2.658	8.3	3.23	8.7	163440.5	2081.	1.	57.93
48.	0.3663E-03	0.9843E 17	4.6	0.001416	4.3	254.0	1.4	0.9379	2.8	3.452	4.8	3.68	5.6	163452.7	2093.	2.	57.92
47.	0.4877E-03	0.1310E 18	3.2	0.001843	3.3	252.9	1.4	1.0709	2.8	4.577	3.5	4.27	4.5	163505.7	2106.	2.	57.92
46.	0.6008E-03	0.1614E 18	2.5	0.002387	2.6	252.5	1.4	1.2234	2.8	5.629	2.9	4.60	4.1	163520.1	2120.	2.	57.92
45.	0.7470E-03	0.2007E 18	2.5	0.003061	2.1	252.9	1.4	1.3976	2.8	7.009	2.9	5.01	4.0	163535.4	2135.	2.	57.92
44.	0.9362E-03	0.2515E 18	1.7	0.003903	1.7	251.3	1.4	1.5972	2.8	8.729	2.2	5.47	3.6	163551.9	2152.	2.	57.91
43.	0.1161E-02	0.3118E 18	1.5	0.004951	1.3	249.3	1.4	1.8271	2.8	10.735	2.1	5.88	3.3	163609.6	2170.	3.	57.91
42.	0.1398E-02	0.3756E 18	1.4	0.006230	1.1	249.8	1.4	2.0911	2.8	12.957	2.0	6.20	3.5	163628.6	2189.	3.	57.91
41.	0.1691E-02	0.4543E 18	1.3	0.007775	0.9	246.6	1.4	2.3951	2.9	15.469	1.9	6.46	3.4	163649.1	2209.	3.	57.90
40.	0.2027E-02	0.5446E 18	1.4	0.009634	0.7	242.2	1.5	2.7492	2.9	18.213	2.0	6.63	3.5	163711.6	2231.	3.	57.90
39.	0.2641E-02	0.7097E 18	1.3	0.011968	0.6	240.0	1.5	3.1617	2.9	23.521	2.0	7.44	3.5	163734.9	2255.	3.	57.89
38.	0.3025E-02	0.8127E 18	1.1	0.014801	0.5	237.2	1.5	3.6416	2.9	26.620	1.8	7.31	3.4	163800.9	2281.	3.	57.89
37.	0.3487E-02	0.9370E 18	1.2	0.018057	0.5	236.6	1.5	4.1988	2.9	30.613	1.9	7.29	3.5	163828.6	2309.	3.	57.88
36.	0.3917E-02	0.1053E 19	1.0	0.021759	0.4	234.6	1.5	4.8453	2.9	34.099	1.8	7.04	3.4	163858.5	2339.	3.	57.88
35.	0.4409E-02	0.1185E 19	1.1	0.025922	0.4	231.6	1.5	5.6001	2.9	37.888	1.8	6.77	3.5	163931.1	2371.	3.	57.87
34.	0.5121E-02	0.1376E 19	0.8	0.030688	0.3	232.3	1.5	6.4775	2.9	44.141	1.7	6.81	3.4	164005.7	2406.	3.	57.87
33.	0.5889E-02	0.1582E 19	0.7	0.036193	0.3	230.5	1.5	7.4953	2.9	50.361	1.7	6.72	3.4	164043.6	2444.	3.	57.86
32.	0.6330E-02	0.1701E 19	0.7	0.042302	0.3	228.1	1.5	8.6850	2.9	53.570	1.6	6.17	3.4	164124.6	2485.	3.	57.86
31.	0.6597E-02	0.1773E 19	0.7	0.048766	0.2	227.6	1.5	10.0734	2.9	55.713	1.7	5.53	3.4	164209.0	2529.	3.	57.85
30.	0.7362E-02	0.1978E 19	1.2	0.055746	0.2	226.2	1.5	11.6916	2.9	61.790	1.9	5.29	3.5	164257.3	2577.	2.	57.85
29.	0.8498E-02	0.2283E 19	0.8	0.063676	0.2	224.5	1.5	13.5843	3.0	70.782	1.7	5.21	3.4	164349.6	2630.	2.	57.85
28.	0.9428E-02	0.2533E 19	1.1	0.072638	0.2	220.4	1.6	15.8151	3.0	77.100	1.9	4.88	3.5	164445.9	2686.	2.	57.85
27.	0.1046E-01	0.2811E 19	0.7	0.082584	0.2	218.5	1.6	18.4514	3.0	84.827	1.7	4.60	3.5	164547.3	2747.	2.	57.84
26.	0.1186E-01	0.3186E 19	0.8	0.093744	0.2	216.8	1.6	21.5556	3.0	95.380	1.8	4.42	3.5	164655.3	2815.	2.	57.84
25.	0.1319E-01	0.3543E 19	0.6	0.106266	0.2	213.9	1.6	25.2252	3.0	104.657	1.7	4.15	3.5	164809.1	2889.	2.	57.85
24.	0.1443E-01	0.3878E 19	0.6	0.120076	0.2	213.3	1.6	29.5589	3.0	114.217	1.7	3.86	3.5	164929.5	2970.	2.	57.85
23.	0.1480E-01	0.3976E 19	0.6	0.134690	0.1	211.1	1.6	34.6752	3.1	115.894	1.7	3.34	3.5	165057.1	3057.	2.	57.85
22.	0.1398E-01	0.3757E 19	0.6	0.149080	0.1	210.9	1.6	40.7161	3.1	109.429	1.7	2.69	3.5	165235.3	3155.	2.	57.85
21.	0.1217E-01	0.3270E 19	0.8	0.162156	0.1	209.6	1.6	47.8391	3.1	94.636	1.8	1.98	3.6	165425.0	3265.	2.	57.86
20.	0.1029E-01	0.2766E 19	1.0	0.173388	0.1	208.9	1.6	56.2545	3.1	79.791	1.9	1.42	3.6	165628.1	3388.	2.	57.87

LAYER BOUNDARIES MILLIATM	OZONE CONTENT MILLIATM-CM
0.0 -- 0.244	0.0
0.244-- 0.488	0.0
0.488-- 0.977	1.161
0.977-- 1.953	4.105
1.953-- 3.906	10.963
3.906-- 7.813	21.704
7.813-- 15.625	34.349
15.625-- 31.250	53.386
31.250-- 62.500	0.0
62.500-- 125.000	20.052
125.000-- 250.000	7.022
250.000--1000.000	26.699

ROCOZ FLIGHT NO. 325.0 FLOWN 112283.(MMDDYY.) 163000.0(HHMMSS.S)
AT 37.850 LAT, -75.480 LONG. ,WALLOPS ISLAND

OZONE FROM THE COMPOSITE PROFILE AND ECC PROFILE AT STANDARD PRESSURE LEVELS

PRESSURE MBAR	ALTITUDE KM	AIR TEMP K	ROCOZ O3 NUM/M3	ROCOZ O3 MRMASS	ECC AIR TEMP K	ECC O3 NUM/M3	ECC O3 MRMASS
0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.15	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.30	56.705	260.2	0.104E 17	2.058	0.0	0.0	0.0
0.40	54.501	256.0	0.182E 17	2.659	0.0	0.0	0.0
0.50	52.797	256.4	0.272E 17	3.184	0.0	0.0	0.0
0.70	50.224	256.9	0.536E 17	4.491	0.0	0.0	0.0
1.00	47.516	253.5	0.114E 18	6.575	0.0	0.0	0.0
1.50	44.470	252.1	0.227E 18	8.706	0.0	0.0	0.0
2.00	42.330	249.7	0.354E 18	10.092	0.0	0.0	0.0
3.00	39.375	240.9	0.645E 18	11.821	0.0	0.0	0.0
4.00	37.341	236.9	0.893E 18	12.093	0.0	0.0	0.0
5.00	35.783	234.0	0.108E 19	11.564	0.0	0.0	0.0
7.00	33.468	231.4	0.148E 19	11.209	0.0	0.0	0.0
10.00	31.049	227.7	0.177E 19	9.217	230.6	0.192E 20	10.109
15.00	28.348	221.9	0.244E 19	8.272	222.5	0.274E 20	9.291
20.00	26.482	217.7	0.300E 19	7.470	220.0	0.363E 20	9.131
30.00	23.907	213.1	0.389E 19	6.323	216.4	0.486E 20	8.015
40.00	22.110	211.0	0.378E 19	4.574	212.9	0.458E 20	5.576
50.00	20.727	209.5	0.314E 19	3.025	212.1	0.391E 20	3.795
70.00	18.607	0.0	0.0	0.0	205.1	0.234E 20	1.570
100.00	16.458	0.0	0.0	0.0	208.0	0.738E 19	0.351
150.00	13.963	0.0	0.0	0.0	213.8	0.349E 19	0.114
200.00	12.128	0.0	0.0	0.0	221.7	0.363E 19	0.092
250.00	10.661	0.0	0.0	0.0	225.2	0.611E 19	0.126
300.00	9.439	0.0	0.0	0.0	233.2	0.544E 19	0.097
400.00	7.415	0.0	0.0	0.0	247.0	0.501E 19	0.071
500.00	5.758	0.0	0.0	0.0	259.4	0.589E 19	0.070
700.00	3.121	0.0	0.0	0.0	273.1	0.690E 19	0.062
850.00	1.532	0.0	0.0	0.0	283.5	0.986E 19	0.075
1000.00	0.167	0.0	0.0	0.0	289.0	0.689E 19	0.046

ORIGINAL PAGE IS
OF POOR QUALITY

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OF POOR QUALITY

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0CARDS 2150: NUMBER OF DATAS RECORDS READ IS  103
0TAPE 2940:  404 RECORDS FROM SMOOTH TAPE
0INARRY 2000: ARRAYS ARE NOT FILLED
PRTPED 2010:  NSAV =       24
 -100.    325.000     101.000  112283.000  163000.000     37.850     -75.480   11684.000   30784.000**************************
 ************************             0.000       0.000      0.000      0.000      0.009      0.000      0.000  EX. DVR!
                                                                                                                      WALLOPS ISLA
+
 -200.    325.000     489.000  120883.000   22284.000      6.500     652.000       5.600     562.000     -19.000      9.880
       25.000       3.860      49.000       1.830      0.0        0.0        0.0        0.0        0.0  DP< AY
 -300.    325.000   30784.000      15.000      47.000     32.410     252.090     -19.000      57.000      35.600    -779.000
        4.000       1.000      39.320       0.0        0.0        0.0        0.0        0.0        0.0  B?  B-Y6
 -400.    325.000   43884.060       0.0         0.0      8.500      16.300      67.000      16.000     281.000     18.000
        4.000       1.700       9.900       0.0        0.0        0.0        0.0        0.0        0.0        AH
 -500.    325.000   60684.000       2.000************       0.0      489.000      83.000     265.300      13.300    194.862
   -3073.270  -23416.398       2.079     292.300      9.100     32.779     -72.546     158.061       1.364  M'=W
 -501. 112283.000     260.000     253.000       0.0        0.0        0.0         0.0     300.800       7.100      8.250
      -3.870       2.061       1.206     306.700      6.800      3.137      -0.504       0.072       1.110
 -502.     70.000      20.000      51.000       0.890************  112283.000    1530.000      18.666      70.000      9.800
    6370.340     234.450     232.550     232.450    236.250    240.050     244.250     247.050     249.350  T1-0771
 -503.    251.250     253.450     252.950     255.150    258.750    261.750     256.450     255.350     256.650    256.350
     256.450     257.450     256.750     255.450    254.050    252.950     252.550     252.950     251.350  B"M-C8,"
 -503.    249.350     249.850     246.650     242.250    240.050    237.250     236.650     234.650     231.650    232.350
     230.550     228.150     227.650     226.250    224.550    220.450     218.550     216.850     213.950  B2":B0<G
 -503.    213.350     211.150     210.950     209.650    208.950      0.0         0.0         0.0         0.0        0.0
       0.0         0.0         0.0         0.0        0.0        0.0        0.0        0.0        0.0  BJM-B83
 -504.  0.700E 02  -0.100E 01   0.500E 02  -0.402E 22 -0.953E 24  0.700E 02   0.535E-05   0.540E 15   0.645E 15  0.750E 15
   0.123E 16  0.172E 16  0.244E 16  0.317E 16  0.399E 16  0.481E 16  0.607E 16  0.733E 16  0.926E 16  KRUG MINZ
 -505.  0.112E 17   0.136E 17   0.161E 17   0.208E 17  0.255E 17  0.319E 17   0.384E 17   0.524E 17   0.664E 17  0.847E 17
   0.103E 18  0.136E 18  0.169E 18  0.221E 18  0.274E 18  0.336E 18  0.398E 18  0.502E 18  0.607E 18  +IV3 +!0$
 -505.  0.740E 18   0.873E 18   0.105E 19   0.122E 19  0.140E 19  0.158E 19   0.180E 19   0.203E 19   0.227E 19  0.252E 19
   0.288E 19  0.324E 19  0.363E 19  0.403E 19  0.428E 19  0.454E 19  0.470E 19  0.486E 19  0.481E 19  88>| 8L
 -505.  0.477E 19   0.440E 19   0.404E 19   0.349E 19  0.295E 19  0.265E 19   0.235E 19   0.218E 19   0.202E 19  0.157E 19
  0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0        0.0  80 0 8Y0
 -506.     22.000       0.091      19.000       0.254************  112283.000    1500.000       0.167     289.000   1000.000
      27.500       1.532     283.500     850.000     38.600      3.121     773.100     700.000      26.000  4A0326
 -507.      1.000       0.254************       5.758    259.400     500.000      21.100       7.415     247.000    400.000
      17.100       9.439     233.200     300.000     17.500     10.661     225.200     250.000      19.000  AN-DC86W
 -507.      1.000       0.254************      12.128    222.700     200.000      11.100      13.963     213.800    150.000
      10.300      16.458     208.000     100.000     21.200     18.607     205.100      70.000      66.300  AB<IB)33
 -507.      1.000       0.254************      19.543    208.900      60.000      90.469      20.669     212.100     50.000
     114.500      22.056     212.900      40.000    134.630     23.858     216.400      30.000     145.100  BL.BBBWW
 -507.      1.000       0.254************      25.013    216.400      25.000     130.400      26.440     220.000     20.000
     110.200      28.308     222.500      15.000     84.100     31.008     230.600      16.000      61.000  BRCLBOWW
 -506.     22.000       0.089      19.000       0.254************  112283.000    1720.000       0.160     290.100   1000.000
      17.700       1.530     285.400     850.000     35.900      3.126     274.300     700.000      26.700  4A0327
 -507.      2.000       0.254************       5.768    259.300     500.000      20.400       7.422     247.200    400.000
      17.300       9.447     232.500     300.000     15.200     10.670     226.000     250.000      22.700  AXI:C84<
 -507.      2.000       0.254************      12.134    221.900     200.000       9.900      13.966     213.000    150.000
       8.600      16.438     207.400     100.000     19.200     18.594     208.400      70.000      80.500  ABU)B)HW
 -507.      2.000       0.254************      19.539    211.300      60.000      89.700      20.667     211.100     50.000
     110.590      22.043     211.900      40.000    127.000     23.855     216.600      30.000     132.500  BLIBBL<<
 -507.      2.000       0.254************      25.023    219.900      25.000     116.600      26.465     220.900     20.000
      85.300      28.373     227.200      15.000     66.700     31.111     233.800      10.000      41.100  BRETB0WW
0TAPWRT 2320: KA2113    FILE 10 ON UNIT 15 HAS  24 RECORDS. LAST RECORD IS TYPE -507.
0TAPWRT 2320: KA2113    FILE 10 ON UNIT 15 HAS  60 RECORDS. LAST RECORD IS TYPE  203.
0TAPWRT 2320: KA2113    FILE 10 ON UNIT 15 HAS  96 RECORDS. LAST RECORD IS TYPE  202.
0TAPWRT 2320: KA2113    FILE 10 ON UNIT 15 HAS 144 RECORDS. LAST RECORD IS TYPE  201.
0TAPWRT 2320: KA2113    FILE 10 ON UNIT 15 HAS 184 RECORDS. LAST RECORD IS TYPE  200.
0TAPWRT 2320: KA2113    FILE 10 ON UNIT 15 HAS 220 RECORDS. LAST RECORD IS TYPE  230.
0TAPWRT 2320: KA2113    FILE 10 ON UNIT 15 HAS 256 RECORDS. LAST RECORD IS TYPE  220.
0TAPWRT 2320: KA2113    FILE 10 ON UNIT 15 HAS 304 RECORDS. LAST RECORD IS TYPE  210.
1COMPST 2060: WORK   NPXTOP,NDXRAS,NLVLS  14   51   38
  0. 57. .0       .0        0.0  0.0 .36E-04 26.7 .0              0.0 .0          0.0 .0        0.0 .38E-04 30.1 .0            0.0 .0          0.0
  0. 56. .0       .0        0.0  0.0 .46E-04 22.7 .0              0.0 .0          0.0 .0        0.0 .50E-04 25.5 .0            0.0 .0          0.0
  0. 55. .0       .0        0.0  0.0 .58E-04 21.1 .0              0.0 .0          0.0 .0        0.0 .63E-04 21.8 .0            0.0 .0          0.0
  0. 54. .0       .0        0.0  0.0 .78E-04 17.4 .0              0.0 .0          0.0 .0        0.0 .78E-04 18.8 .0            0.0 .0          0.0
  0. 53. .0       .0        0.0  0.0 .96E-04 15.5 .0              0.0 .0          0.0 .0        0.0 .99E-04 15.8 .0            0.0 .0          0.0
  0. 52. .0       .0        0.0  0.0 .12E-03 14.2 .0              0.0 .0          0.0 .0        0.0 .13E-03 13.0 .0            0.0 .0          0.0
  0. 51. .0       .0        0.0  0.0 .16E-03 10.7 .0              0.0 .0          0.0 .0        0.0 .16E-03 10.7 .0            0.0 .0          0.0
  0. 50. .0       .0        0.0  0.0 .21E-03 10.7 .0              0.0 .0          0.0 .0        0.0 .21E-03  9.8 .0            0.0 .0          0.0
  0. 49. .0       .0        0.0  0.0 .28E-03  8.1 .0              0.0 .0          0.0 .0        0.0 .28E-03  8.4 .0            0.0 .0          0.0
  0. 48. .0       .0        0.0  0.0 .37E-03  7.4 .36E-03 12.4 .0              0.0 .0        0.0 .37E-03  7.2 .36E-03 10.4 .0          0.0
  0. 47. .0       .0        0.0  0.0 .48E-03  5.5 .50E-03  7.7 .0              0.0 .0        0.0 .47E-03  5.7 .47E-03  8.6 .0          0.0
  0. 46. .0       .0        0.0  0.0 .60E-03  4.3 .60E-03  6.2 .0              0.0 .0        0.0 .61E-03  4.6 .61E-03  6.2 .0          0.0
  0. 45. .0       .0        0.0  0.0 .75E-03  3.7 .74E-03  7.7 .0              0.0 .0        0.0 .76E-03  3.4 .77E-03  5.7 .0          0.0
  0. 44. .0       .0        0.0  0.0 .92E-03  2.7 .97E-03  4.7 .0              0.0 .0        0.0 .92E-03  2.8 .95E-03  4.2 .0          0.0
  0. 43. .0       .0        0.0  0.0 .11E-02  2.6 .12E-02  4.8 .13E-02 15.2 .0        0.0 .11E-02  2.7 .12E-02  4.0 .13E-02   9.6
  0. 42. .0       .0        0.0  0.0 .13E-02  2.6 .15E-02  4.0 .15E-02 13.4 .0        0.0 .13E-02  2.9 .15E-02  2.9 .16E-02   8.7
  0. 41. .0       .0        0.0  0.0 .15E-02  3.3 .18E-02  2.6 .18E-02 10.2 .0        0.0 .15E-02  3.7 .19E-02  2.6 .19E-02   6.0
  0. 40. .0       .0        0.0  0.0 .15E-02  5.1 .22E-02  2.6 .23E-02  3.2 .0        0.0 .15E-02  5.6 .22E-02  2.0 .23E-02   5.3
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ORIGINAL PAGE IS
OF POOR QUALITY

0.	39.	.0	.0	0.0	0.1	.0	0.0	.26E-02	2.0	.27E-02	5.5	.27E-02	13.9	.0	0.0	.26E-02	1.9	.27E-02	4.1
0.	38.	.0	.0	0.0	0.1	.0	0.0	.30E-02	1.7	.31E-02	4.9	.31E-02	11.2	.0	0.0	.29E-02	1.7	.31E-02	3.5
0.	37.	.0	.0	0.0	0.1	.0	0.0	.34E-02	2.0	.36E-02	4.2	.37E-02	10.4	.0	0.0	.34E-02	1.9	.36E-02	3.2
0.	36.	.0	.0	0.0	0.1	.0	0.0	.38E-02	1.7	.41E-02	3.7	.40E-02	8.2	.0	0.0	.38E-02	1.9	.41E-02	2.5
0.	35.	.0	.0	0.0	0.1	.0	0.0	.44E-02	2.0	.45E-02	3.4	.42E-02	8.0	.0	0.0	.44E-02	2.1	.47E-02	2.2
0.	34.	.0	.0	0.0	0.1	.0	0.0	.50E-02	1.8	.53E-02	2.1	.51E-02	5.2	.0	0.0	.50E-02	2.2	.53E-02	1.7
0.	33.	.0	.0	0.0	0.1	.0	0.0	.54E-02	2.1	.60E-02	1.7	.63E-02	3.4	.0	0.0	.54E-02	2.4	.59E-02	1.5
0.	32.	.0	.0	0.0	0.1	.0	0.0	.59E-02	2.2	.64E-02	1.3	.67E-02	3.2	.0	0.0	.58E-02	2.6	.62E-02	1.4
0.	31.	.0	.0	0.0	0.1	.0	0.0	.63E-02	2.8	.67E-02	1.4	.67E-02	3.0	.0	0.0	.62E-02	3.3	.67E-02	1.4
0.	30.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.74E-02	1.8	.74E-02	3.6	.0	0.0	.0	0.0	.74E-02	1.3
0.	29.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.84E-02	1.3	.87E-02	2.5	.0	0.0	.0	0.0	.82E-02	1.3
0.	28.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.93E-02	1.7	.97E-02	2.9	.0	0.0	.0	0.0	.90E-02	1.2
0.	27.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.10E-01	1.1	.11E-01	1.9	.0	0.0	.0	0.0	.10E-01	1.3
0.	26.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.12E-01	1.2	.12E-01	2.0	.0	0.0	.0	0.0	.12E-01	1.1
0.	25.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.13E-01	1.0	.13E-01	1.4	.0	0.0	.0	0.0	.13E-01	1.2
0.	24.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.14E-01	1.0	.15E-01	1.3	.0	0.0	.0	0.0	.14E-01	1.3
0.	23.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.14E-01	1.2	.16E-01	1.4	.0	0.0	.0	0.0	.13E-01	1.5
0.	22.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.13E-01	1.3	.15E-01	1.2	.0	0.0	.0	0.0	.12E-01	1.9
0.	21.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.12E-01	1.7	.13E-01	1.6	.0	0.0	.0	0.0	.11E-01	2.4
0.	20.	.0	.0	0.0	0.1	.0	0.0	.0	0.0	.10E-01	2.0	.11E-01	1.9	.0	0.0	.0	0.0	.95E-02	3.2

COMPARISON OF D(LN I)/DM WITH B FROM SMOOTH FOR FILTER S3

ALT-KM	D(LN I)/DM	NOISE	B(SMOOTH)	STDEV	DIFFERENCE+,-	ERROR	DIFFx
57.	-0.0132	0.0035	-0.0116	0.0004	-0.0016	0.0036	13.06
56.	-0.0168	0.0038	-0.0160	0.0004	-0.0009	0.0039	5.37
55.	-0.0213	0.0045	-0.0194	0.0005	-0.0019	0.0045	9.33
54.	-0.0285	0.0049	-0.0250	0.0007	-0.0035	0.0050	13.05
53.	-0.0348	0.0054	-0.0341	0.0009	-0.0007	0.0054	1.92
52.	-0.0449	0.0064	-0.0428	0.0009	-0.0021	0.0065	4.90
51.	-0.0578	0.0062	-0.0568	0.0012	-0.0010	0.0063	1.79
50.	-0.0755	0.0081	-0.0721	0.0012	-0.0035	0.0082	4.68
49.	-0.0993	0.0081	-0.0937	0.0018	-0.0057	0.0083	5.87
48.	-0.1286	0.0094	-0.1258	0.0020	-0.0027	0.0096	2.13
47.	-0.1656	0.0090	-0.1659	0.0023	0.0003	0.0092	-0.17
46.	-0.2028	0.0086	-0.2054	0.0021	0.0026	0.0088	-1.28
45.	-0.2460	0.0089	-0.2435	0.0019	-0.0025	0.0091	1.00
44.	-0.2912	0.0075	-0.2922	0.0026	0.0011	0.0079	-0.37
43.	-0.3353	0.0085	-0.3349	0.0023	-0.0004	0.0088	0.12
42.	-0.3738	0.0095	-0.3756	0.0025	0.0018	0.0099	-0.48
41.	-0.3963	0.0130	-0.4076	0.0038	0.0114	0.0135	-2.82
40.	-0.3773	0.0191	-0.4006	0.0061	0.0233	0.0201	-5.98

COMPARISON OF D(LN I)/DM WITH B FROM SMOOTH FOR FILTER S2

ALT-KM	D(LN I)/DM	NOISE	B(SMOOTH)	STDEV	DIFFERENCE+,-	ERROR	DIFFx
48.	-0.0225	0.0028	-0.0234	0.0005	0.0009	0.0028	-3.87
47.	-0.0306	0.0024	-0.0299	0.0006	-0.0007	0.0024	2.35
46.	-0.0368	0.0023	-0.0356	0.0006	-0.0012	0.0024	3.24
45.	-0.0453	0.0035	-0.0428	0.0006	-0.0025	0.0035	5.70
44.	-0.0588	0.0027	-0.0571	0.0012	-0.0017	0.0030	2.99
43.	-0.0740	0.0035	-0.0738	0.0010	-0.0002	0.0036	0.34
42.	-0.0899	0.0036	-0.0889	0.0008	-0.0010	0.0037	1.08
41.	-0.1084	0.0027	-0.1066	0.0013	-0.0017	0.0030	1.62
40.	-0.1302	0.0032	-0.1328	0.0011	0.0026	0.0034	-2.00
39.	-0.1525	0.0029	-0.1525	0.0010	0.0000	0.0031	-0.02
38.	-0.1726	0.0026	-0.1734	0.0013	0.0009	0.0029	-0.51
37.	-0.1929	0.0036	-0.1906	0.0013	-0.0023	0.0038	1.20
36.	-0.2168	0.0033	-0.2140	0.0018	-0.0028	0.0038	1.29
35.	-0.2448	0.0045	-0.2403	0.0016	-0.0045	0.0048	1.88
34.	-0.2733	0.0044	-0.2722	0.0022	-0.0011	0.0049	0.40
33.	-0.2924	0.0058	-0.2965	0.0022	0.0040	0.0063	-1.36
32.	-0.3099	0.0065	-0.2998	0.0029	-0.0101	0.0071	3.31
31.	-0.3264	0.0089	-0.3396	0.0035	0.0131	0.0095	-3.95

COMPARISON OF D(LN I)/DM WITK B FROM SMOOTH FOR FILTER S1

ALT-KM	D(LN I)/DM	NOISE	B(SMOOTH)	STDEV	DIFFERENCE+,-	ERROR	DIFFx
43.	-0.0200	0.0030	-0.0215	0.0009	0.0015	0.0032	-7.33
42.	-0.0242	0.0032	-0.0238	0.0010	-0.0003	0.0034	1.36
41.	-0.0286	0.0029	-0.0253	0.0012	-0.0033	0.0031	12.19
40.	-0.0353	0.0029	-0.0335	0.0010	-0.0018	0.0030	5.19
39.	-0.0421	0.0023	-0.0420	0.0009	-0.0002	0.0025	0.45
38.	-0.0486	0.0024	-0.0492	0.0008	0.0007	0.0025	-1.40
37.	-0.0564	0.0023	-0.0549	0.0012	-0.0015	0.0026	2.78
36.	-0.0626	0.0023	-0.0618	0.0012	-0.0007	0.0026	1.18
35.	-0.0692	0.0023	-0.0710	0.0009	0.0017	0.0025	-2.49
34.	-0.0805	0.0016	-0.0769	0.0008	-0.0036	0.0018	4.63
33.	-0.0918	0.0015	-0.0955	0.0004	0.0037	0.0015	-3.94
32.	-0.0977	0.0011	-0.0997	0.0005	0.0020	0.0012	-2.05

31.	-0.1015	0.0012	-0.0993	0.0005	-9.0022	0.0013	2.19
30.	-0.1109	0.0018	-0.1066	0.0006	-0.0043	0.0019	3.98
29.	-0.1257	0.0013	-0.1273	0.0011	0.0016	0.0017	-1.26
28.	-0.1382	0.0022	-0.1412	0.0006	0.0030	0.0022	-2.16
27.	-0.1526	0.0013	-0.1459	0.0009	-0.0067	0.0016	4.52
26.	-0.1724	(.0017	-0.1811	0.0006	0.0087	0.0018	-4.92
25.	-0.1905	0.0013	-0.1843	0.0006	-0.0062	0.0015	3.30
24.	-0.2027	0.0015	-0.2123	0.0007	0.0083	0.0016	-4.00
23.	-0.2046	0.0019	-0.2052	0.0907	0.0007	0.0021	-0.33
22.	-0.1914	0.0021	-0.1946	0.0011	0.0030	0.0026	-1.54
21.	-0.1702	0.0026	-0.1694	0.0012	-0.0008	0.0028	0.49
20.	-0.1479	0.0028	-3.1491	0.0014	0.0011	0.0031	-0.76

COMPARISON OF D(LN I)/DH WITH B FROM SMOOTH FOR FILTER S0

ALT-KM	D(LN I)/DH	NOISE	B(SMOOTH)	STDEV	DIFFERENCE+,-	ERROR	DIFFx
39.	-0.0167	0.0023	-0.0156	0.0008	-0.0011	0.0025	6.72
38.	-0.0189	0.0021	-0.0203	0.0009	0.0014	0.0023	-7.17
37.	-0.0224	0.0023	-0.0205	0.0010	-0.0019	0.0025	8.95
36.	-0.0242	0.0020	-0.0244	0.0012	0.0003	0.0023	-1.10
35.	-9.0256	0.0020	-9.0266	0.0008	0.0010	0.0022	-3.84
34.	-0.0311	0.0016	-0.0271	0.0006	-0.0039	0.0017	13.43
33.	-0.0382	0.0013	-0.0414	0.0006	0.0032	0.0014	-8.89
32.	-0.0407	0.0013	-0.0435	0.0005	0.0028	0.0014	-6.64
31.	-0.0405	0.0012	-0.0383	0.0006	-0.0022	0.0013	5.50
30.	-0.0447	0.0016	-0.0410	0.0005	-0.0037	0.0016	8.54
29.	-0.0527	0.0013	-0.0544	0.0009	0.0017	0.0015	-3.18
28.	-0.0586	0.0017	-0.0616	0.0007	0.0030	0.0018	-5.00
27.	-0.0649	0.0011	-0.0611	0.0007	-0.0039	0.0013	6.14
26.	-0.0729	0.0010	-0.0804	0.0004	0.0075	0.0014	-9.78
25.	-0.0809	0.0009	-0.0744	0.0006	-0.0064	0.0011	8.31
24.	-0.0901	0.0010	-0.0949	0.0005	0.0048	0.0011	-5.16
23.	-0.0944	0.0012	-0.0927	0.0003	-0.0017	0.0012	1.85
22.	-0.0902	0.0009	-0.0942	0.0006	0.0040	0.0010	-4.34
21.	-0.0800	0.0011	-0.0786	0.0005	-0.0014	0.0012	1.81
20.	-0.0701	0.0012	-0.0710	0.0005	0.0010	0.0013	-1.35

COMPARISON OF D(LN I)/DH WITH B FROM SMOOTH FOR FILTER S3/0

ALT-KM	D(LN I)/DH	NOISE	B(SMOOTH)	STDEV	DIFFERENCE+,-	ERROR	DIFFx
57.	-0.0138	0.0042	-0.0122	0.0005	-0.0017	0.0042	12.81
56.	-0.0180	0.0046	-0.0159	0.0006	-0.0021	0.0046	12.12
55.	-0.0226	0.0049	-0.0206	0.0006	-0.0020	0.0050	9.07
54.	-0.0278	0.0052	-0.0264	0.0007	-0.0014	0.0053	5.21
53.	-0.0355	0.0056	-0.0346	0.0008	-0.0009	0.0057	2.56
52.	-0.0460	0.0060	-0.0432	0.0009	-0.0028	0.0061	6.38
51.	-0.0580	0.0062	-0.0566	0.0011	-0.0015	0.0063	2.55
50.	-0.0738	0.0072	-0.0710	0.0012	-0.0028	0.0073	3.88
49.	-0.0972	0.0082	-0.0928	0.0015	-0.0044	0.0083	4.67
48.	-0.1260	0.0090	-0.1206	0.0020	-0.0054	0.0092	4.40
47.	-0.1603	0.0091	-0.1595	0.0023	-0.0008	0.0094	0.52
46.	-0.2002	0.0091	-0.2026	0.0021	0.0024	0.0093	-1.17
45.	-0.2431	0.0081	-0.2418	0.0021	-0.0014	0.0083	0.57
44.	-0.2849	0.0077	-0.2867	0.0021	0.0018	0.0080	-0.62
43.	-0.3276	0.0085	-0.3259	0.0022	-0.0017	0.0088	0.53
42.	-0.3646	0.0103	-0.3672	0.0030	0.0026	0.0107	-0.72
41.	-0.3869	0.0142	-0.3991	0.0042	0.0122	0.0149	-3.09
40.	-0.3645	0.0203	-0.3914	0.0066	0.0269	0.0214	-7.12

COMPARISON OF D(LN I)/DH WITH B FROM SMOOTH FOR FILTER S2/0

ALT-KM	D(LN I)/DH	NOISE	B(SMOOTH)	STDEV	DIFFERENCE+,-	ERROR	DIFFx
48.	-0.0201	0.0021	-0.0199	0.0005	-0.0002	0.0021	1.16
47.	-0.0261	0.0022	-0.0249	0.0005	-0.0013	0.0023	4.93
46.	-0.0338	0.0021	-0.0334	0.0006	-0.0004	0.0022	1.05
45.	-0.0423	0.0024	-0.0417	0.0005	-0.0006	0.0025	1.38
44.	-0.0525	0.0022	-0.0531	0.0007	0.0006	0.0023	-1.12
43.	-0.0658	0.0026	-0.0646	0.0007	-0.0012	0.0027	1.83
42.	-0.0815	0.0023	-0.0811	0.0009	-0.0004	0.0025	0.52
41.	-0.9994	0.0025	-0.0998	0.0008	0.0004	0.0026	-0.42
40.	-0.1174	0.0021	-0.1185	0.0008	0.0011	0.0023	-0.93
39.	-0.1346	0.0023	-0.1338	0.0008	-0.0008	0.0025	0.62
38.	-0.1527	0.0024	-0.1544	0.0010	0.0017	0.0026	-1.11
37.	-0.1717	0.0031	-0.1714	0.0012	-0.0003	0.0033	0.15
36.	-0.1931	0.0034	-0.1900	0.0016	-0.0031	0.0038	1.64
35.	-0.2185	0.0043	-0.2112	0.0018	-0.0073	0.0046	3.40
34.	-0.2423	0.0049	-0.2466	0.0022	0.0043	0.0054	-1.75
33.	-0.2551	0.0059	-0.2556	0.0025	0.0004	0.0064	-0.15
32.	-0.2692	0.0067	-0.2574	0.0030	-0.0118	0.0073	4.48
31.	-0.2858	0.0091	-0.2988	0.0034	0.0131	0.0097	-4.47

ORIGINAL PAGE IS
OF POOR QUALITY

COMPARISON OF D(LN I)/DH WITH B FROM SMOOTH FOR FILTER S1/0

ALT-KM	D(LN I)/DH	NOISE	B(SMOOTH)	STDEV	DIFFERENCE+,-	ERROR	DIFF%
43.	-0.0126	0.0012	-0.0130	0.0004	0.0005	0.0013	-3.63
42.	-0.0153	0.0013	-0.0157	0.0004	0.0004	0.0014	-2.58
41.	-0.0184	0.0011	-0.0182	0.0004	-0.0002	0.0012	1.34
40.	-0.0222	0.0012	-0.0217	0.0004	-0.0005	0.0012	2.10
39.	-0.0260	0.0011	-0.0262	0.0004	0.0002	0.0011	-0.80
38.	-0.0295	0.0010	-0.0297	0.0005	0.0002	0.0011	-0.75
37.	-0.0340	0.0011	-0.0336	0.0004	-0.0003	0.0011	0.91
36.	-0.0386	0.0009	-0.0382	0.0005	-0.0004	0.0010	1.09
35.	-0.0438	0.0009	-0.0437	0.0004	-0.0000	0.0010	0.03
34.	-0.0494	0.0008	-0.0503	0.0003	0.0008	0.0008	-1.69
33.	-0.0537	0.0007	-0.0541	0.0003	0.0003	0.0008	-0.58
32.	-0.0569	0.0007	-0.0558	0.0003	-0.0011	0.0007	2.00
31.	-0.0611	0.0007	-0.0609	0.0003	-0.0002	0.0008	0.29
30.	-0.0663	0.0007	-0.0656	0.0004	-0.0007	0.0008	1.10
29.	-0.0729	0.0008	-0.0733	0.0003	0.0004	0.0008	-0.59
28.	-0.0795	0.0008	-0.0795	0.0004	-0.0000	0.0009	0.05
27.	-0.0880	0.0009	-0.0841	0.0004	-0.0038	0.0010	4.45
26.	-0.0995	0.0009	-0.1005	0.0005	0.0010	0.0010	-1.01
25.	-0.1096	0.0011	-0.1086	0.0004	-0.0010	0.0012	0.92
24.	-0.1139	0.0012	-0.1177	0.0005	0.0038	0.0013	-3.27
23.	-0.1100	0.0014	-0.1127	0.0007	0.0027	0.0016	-2.41
22.	-0.1011	0.0018	-0.1001	0.0008	-0.0010	0.0019	0.99
21.	-0.0904	0.0020	-0.0901	0.0009	-0.0004	0.0022	0.40
20.	-0.0777	0.0024	-0.0791	0.0011	0.0014	0.0027	-1.77

0TAPWRT 2320: KA2113   FILE 10 ON UNIT 15 HAS 361 RECORDS. LAST RECORD IS TYPE 500.
0MAIN 2990: PROGRAM END